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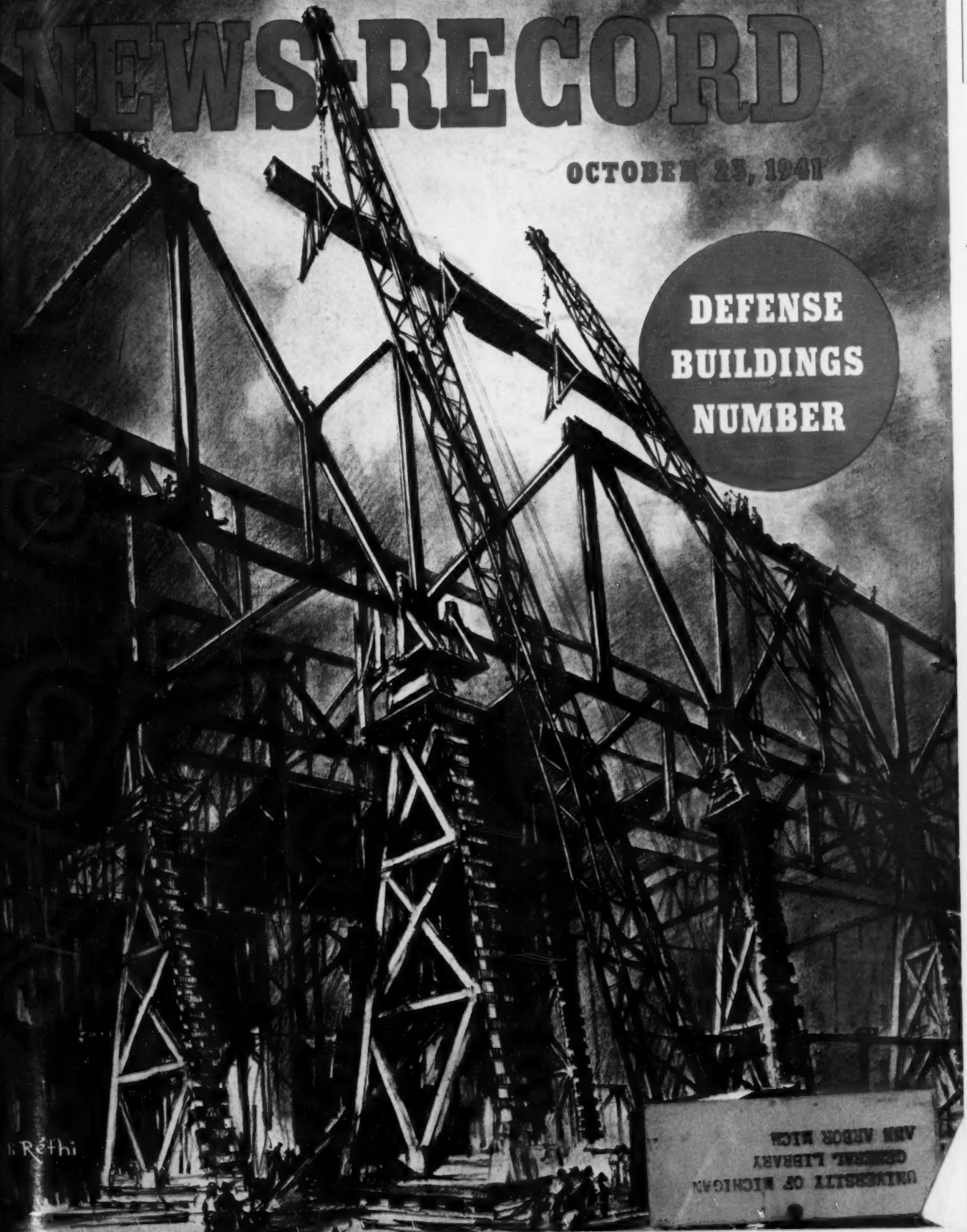
ENGINEERING NEWS-RECORD

OCTOBER 23, 1941

DEFENSE BUILDINGS NUMBER



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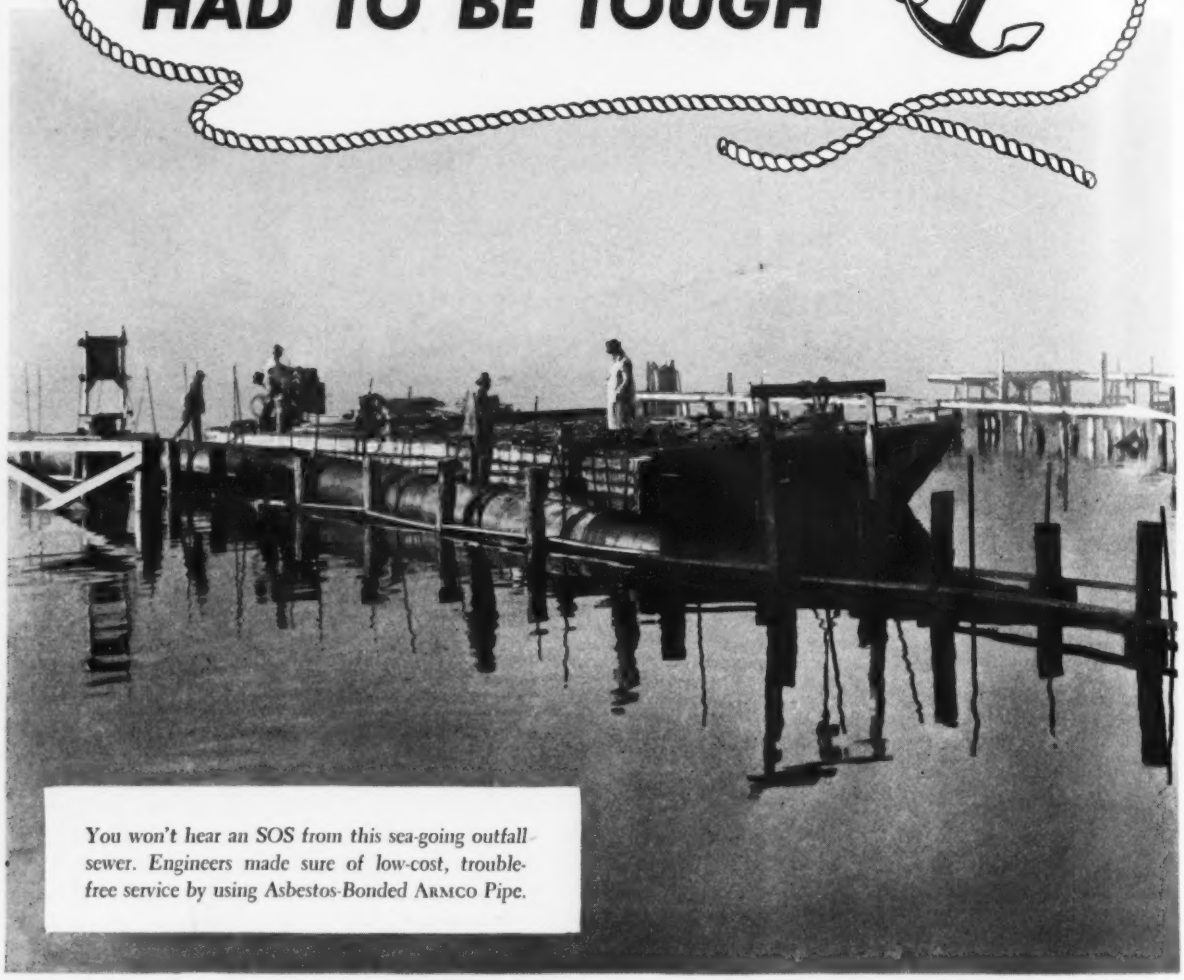

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Vol. 127 OCTOBER 23, 1941 No. 17

THIS WEEK

• A review of the design and construction of outstanding buildings, being built by the Army and Navy in the country's vast defense expansion program is presented in a special 32-page section. Functional characteristics of these buildings, notable design features and some unusual methods of construction provide much valuable information for designers and constructors in the building field.

• "How can I get the Material?" is the No. 1 question being asked by construction men everywhere today. In a four-page article on "How Priorities Work in Construction," our Washington Correspondent reviews past priority rulings and outlines in simple, understandable language.

• Looking toward a solution of the problem of aerodynamic instability in suspension bridges, an article by the staff of Modjeski and Masters, consulting engineers, reviews past experiences and outlines at least two interesting remedial measures and a proposed new design.

• A cantilever form was developed for use at Mahoning Dam, which, in comparison with the forms used by TVA on the Hiwassee Dam, proved 10 percent cheaper and produced better concrete surfaces. A description of the form and its advantages appears in this issue.

THINGS TO COME

• To stop the flow, under Hales Bar Dam on the Tennessee River, TVA has developed a method of sealing that involves the drilling of a series of vertical overlapping holes, and as close as possible to the upstream face of the dam. About 750 holes will be required. Method and procedure will be described in an early issue.

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Photograph of two pages from "A White Guide to Safety"

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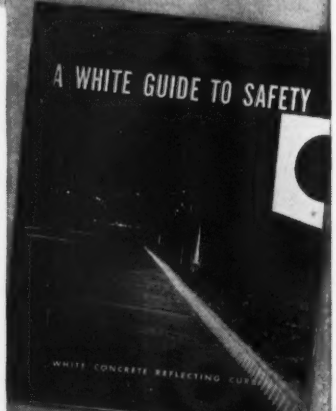

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ENR-M-25

Defense construction heads A.S.C.E. meeting topics

Military and civil authorities are prominent speakers on Chicago convention program. Ernest Black of Kansas City is nominated for president during 1942.

Superimposed on a technical session program largely devoted to Chicago water, sewerage and transportation problems, discussions on defense construction by high-ranking army, navy and federal officials dominated the fall meeting of the American Society of Civil Engineers at Chicago last week. High spot of the meeting was a stirring address by Brig. Gen. Brehon B. Somervell, head of the construction division of the Quartermaster Corps, who painted a grim picture of dark days ahead and pleaded for public realization of the work to be done and the sacrifices to be made. Other army and navy officers presented details of defense construction, while civilian protection was outlined by federal officials. Eye-witness accounts of recent observations in England added interest to the program.

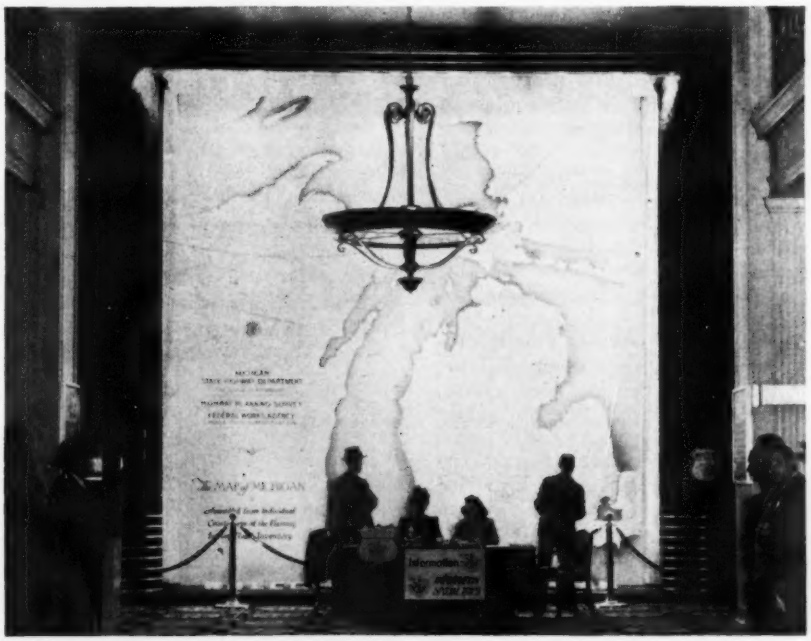
Prominent in actions of the society's board of direction, which met early in the week, was the nomination of Ernest B. Black, of Black & Veatch, Kansas City, Mo., consulting engineers, for president in 1942. Protests were made by the board against the recent SPAB policy statement (SPA-9) concerning private and non-defense construction, and the growing socialization of the engineering profession. The board also developed an outline of principles for post-emergency construction.

Gen. Somervell hits hard

After a summary of defense construction accomplishments, in which he praised engineers, architects and contractors for their part, Gen. Somervell, in a talk before a joint meeting of the society and the Chicago Association of Commerce, lashed out at those who still regard the war overseas as a large-scale "Dodger-Yankee baseball game." We are arming today, he stated, because "two incompatible philosophies of life and government are locked in mortal combat. If England and Russia fail, America will be next on Hitler's timetable." To offset the 7-year start in arms production by Hitler "will take a lot of sweat, speed and sacrifice on our part," Gen. Somervell believes.

Turning again to defense construction, the general struck at critics of the program. "The sound of hammers on cantonments has ceased," he said, "but the knocking still goes on." Time, he pointed out, is the most expensive item in the category of the construction industry. "It was a lucky thing for us that Hitler left some of it on the market. We bought it and built it into factories, storehouses, munitions and aircraft plants, and sturdy barracks for sturdy Americans." Yet, he explained, his references to armament construction achievements are not for the "purposes of painting a complacent picture of satisfactory progress. We have done a lot but not nearly enough; we

(*Continued on p.* 80)



Largest map of Michigan displayed

During the annual meeting of the American Association of State Highway Officials in Detroit early this month, the largest, most complete and accurate map of Michigan ever prepared was on display at the Statler Hotel, convention headquarters. The map is 24 ft. high and 20 ft. wide, and is composed of 100 sections.

All highways in the state, including both county and state routes, are shown, as are traffic volume, school bus and rural mail delivery routes, roadside culture features, and lakes. The map is drawn to a scale of one inch per mile. A survey that required more than a year was conducted by the Michigan State Highway Department in cooperation with the Public Roads Administration to obtain the data shown.

Priorities of materials chief topic at A.G.C. fall meeting at Detroit

Contractors discuss SPAB's plan to reduce non-essential construction and listen to OPM experts in session largely devoted to defense problems. Kimball and Coblentz will be new officers.

Convening four days after the now-famous SPAB policy statement concerning private and non-defense construction was issued, members of the Associated General Contractors of America had plenty to talk about at their fall board meeting at Detroit last week. However, the priorities situation and the SPAB policy statement (SPA-9) of Oct. 9 were clarified by an excellent talk by John L. Haynes, chief of OPM's lumber and building materials branch, who stated the order was not a ban, but a statement of policy issued to help rather than to hinder the construction industry. Further evidence of a desire on the part of OPM to help construction was given by Henry H. Waples, bureau of industrial conservation, OPM, who told of successful efforts to substitute available materials for critical materials.

In advance of the general meeting, secretaries and managers of the various A.G.C. chapters and branches met for an all-day session of their own. Labor, public relations and, of course, priorities were chief topics of discussion at that meeting. They told of some success in getting blanket priorities on certain projects, but it was evident from the discussion that requests for PD-1 priorities were usually more successful. On the PD-1 form a request is made for specific materials or supplies from a specific manufacturer for a specific project. This is the form to use if lack of a small number of items is holding up the job.

The secretaries reported little trouble with labor, which again emphasizes the fact that construction has been remarkably free of labor difficulties in the defense program, as compared with other industries. However, many chapters having labor agreements have been notified by labor that higher rates will be demanded at the expiration of present agreements; in a few cases the demands are for raises Jan. 1 even though the agreements do not expire until later.

Haynes explains SPAB order

Mr. Haynes outlined the current difficult situation in regard to critical materials and then plunged into an explanation of the SPAB ruling concerning non-defense construction. He told of how designers were already being asked to strip their projects of all possible items that use critical materials —"strip tease performance" he called it—a procedure necessary to get a priority rating. But such procedure is, he explained, only of stop-gap nature.

In explaining SPA-9 he said: "The prime consideration in such policy is obviously the diversion of steel and copper to those works most deserving at this time—a more equitable distribution of material in the light of the emergency. Some people, including contractors, are bound to be adversely affected by this program and other features of the national defense program. Business as usual is an impossibility.

"But by and large is not the construction industry as well off today, Oct. 14, as it was on Oct. 8 before SPA-9 was issued? As a practical matter, does not the proposed program merely formalize conditions as they existed last week with the edges trimmed off? . . . I suggest that there are many benefits to A.G.C. in SPA-9. There should be better deliveries to that large amount of construction work still to be undertaken. With the mad scramble for materials curtailed, with some of the speculators out of the way, prices should be better, and danger of ruinous inflationary tendencies lessened.

"I have discussed," Mr. Haynes said in conclusion, "SPA-9 with Mr. Henderson. . . . He has authorized me to state he will not see civilian life cut off, and that he is determined that necessary civilian construction shall go forward in an orderly manner. As you further know, he is dedicated to the proposition that inflation should be prevented. Through closer check-ups of essential raw materials and firmer controls to prevent inequities in allocations, I say to you gentlemen who represent purchasers of about 1/6 of the nation's steel, the so-called dark cloud may have a silver lining."

Substitutes for critical materials

Mr. Waples told of how four factors—conservation, simplification, substitution and standardization—were helping construction in these times of material shortage. Steel is critical, he said, but copper is worse, and a special order on copper will be issued within a few days. The order, he stated, will affect construction in the following items, to mention but a few: building supplies and hardware, plumbing and heating, pipe and fittings, and air conditioning.

Mr. Haynes and Mr. Waples held the floor for two hours following their talks in order to answer questions. Out of the questions and answers it was revealed: that there is little hope for small local contractors to continue operating, except on repair work in essential plants; that allocations will be made of metals for such important items as nails and equipment repair parts; that the military officer in charge of a defense project has authority to issue a priority for repair parts of vital equipment on the job; that the priority system is not to be abandoned; that some future defense

SPAB'S new order is discussed by A.G.C. members

The recently announced plan of the Supply, Priorities and Allocations Board to restrain civilian construction not essential to the nation's defense program was an important topic of discussion at the fall board meeting of the Associated General Contractors of America in Detroit last week. Four very much concerned men who got together to talk about the plan were, left to right: W. A. Watson, A.G.C. president; John L. Haynes, chief of building materials for the Office of Production Management; Henry H. Waples of OPM's bureau of industrial conservation; and H. E. Foreman, managing director of the A.G.C.

plants may be built partly or all of wood; and that there is no telling now what constitutes an essential civilian construction project, since each case must be decided upon its merit. They both agreed with a suggestion made by H. E. Foreman, managing director of the A.G.C., that construction equipment must be maintained in top shape, for the present emergency may become a lot worse.

Looking ahead in construction

A. P. Greensfelder, St. Louis, who proposed the Construction Research Institute which was authorized at the spring board meeting this year, again appealed to contractors to "Stop, Look and Listen" if they are to survive. The research institute would study and develop markets for contractors, and Mr. Greensfelder pleads for better support and more interest than has been shown.

The future of highway construction, according to an analysis by A.G.C. staff members, depends upon the passage of the defense highway bill now before Congress and the interpretation to be given the SPA Release 9, which mentioned highway work. The amount of defense work on main highway routes is certain to be greater in 1942 than in the current year.

Considerable discussion arose over the merits of fixed-fee and lump-sum or unit-price forms of contract for defense projects. Contractors have been unjustly criticised for so-called excess costs under the fixed-fee system, and believe they have been taken advantage of in some cases in regard to the equipment recapture clause in such contracts. It was reported that the recapture clause has been eliminated from the fixed-fee contract, but at the expense of much lower rental rates. Where the project has been fully designed and plans all prepared, the lump-sum or unit-price contract would be better, several contractors pointed out. However, after much discussion, it was decided best and proper to leave the form of contract to the awarding authorities.

An award of $500, donated by an unknown party and to be divided into three prizes, was announced for the best solution of providing additional traffic lanes over hills and around curves. It was named the M. W. Watson Award, in honor of the president of the organization, and will be administered by the joint A.G.C.-A.A.S.H.O. cooperative committee.

Dan W. Kimball, president, Ames-Owen Kimball Co., Grand Rapids, Mich., and Oscar B. Coblentz, president, McLean Contracting Co., Baltimore, were nominated as president and vice-president of A.G.C., respectively, for 1942. They are to take office at the next annual meeting, which is scheduled for Seattle, Wash., Feb. 16-19, 1942. Mr. Kimball is the present vice-president.

SPAB's policy on non-defense building clarified by Director Donald Nelson

Proposal not seen as stop-order on building work but as an aid in obtaining materials for essential projects.

Director Donald Nelson of the Supply, Priorities, and Allocations Board this week issued a statement clarifying SPAB's recent announcement of policy on the issuance of priority ratings to construction projects (*ENR*, Oct. 16, p. 525). Mr. Nelson's statement emphasized that, as pointed out last week in *ENR*, the SPAB policy is not a stop-order on construction; it simply emphasizes that priority aid in getting materials will be restricted to essential projects and warns that jobs started subsequent to announcement of the policy which run into material difficulties need expect no help from priorities division.

In his statement, which was in the form of a letter to Senator Wiley of Wisconsin, Mr. Nelson said:

"I believe the nature of this policy has been somewhat misunderstood. In substance, it is a policy for the OPM Division of Priorities to follow hereafter in granting priorities assistance on construction projects. As existing shortages in the critical metals become more and more acute it becomes more and more difficult for a builder to obtain structural steel, plumbing and heating equipment, electric wiring and equipment), and so on, without a priority rating. Within a few months it may be practically impossible for the builder to get such items without priority assistance. Consequently, the policy means that henceforward, if a builder is unable to get these metal items without a priority rating, he will not be able to get them at all unless he can satisfy the Division of Priorities that the job he is working on is essential to the nation, either directly for national defense or indirectly as a safeguard to civilian health and safety.

"Thus, while the policy will put sharp limits on new construction which may hereafter be initiated, it is far from being a blanket 'stop building' order. Such basic building materials as lumber, brick, stone, mortar, concrete and the various clay products are not particularly scarce, are not under priority control, and hence may be obtained freely for any building job whatever. The man who plans a construction job which uses only these materials and does not involve the use of steel, copper and brass components is as free to go ahead now a he was a year ago.

"I think it is important for everyone to understand the following point, as well: that although we have undertaken to grant help, where possible, in order that needed buildings now under construction and substantially along the road to completion may be finished, that policy will not apply to building begun hereafter. Certainly, if a builder undertakes now to start a new building without priority assistance and finds when it is half finished that he cannot complete it without getting a priority rating, he will not be able to get that rating merely on the plea that he must have help to wind up his job.

"Materials will continue to be made available for defense housing, for all defense industrial construction, and for other jobs which are vitally necessary to the country's civilian health and safety. We cannot do less than that; I believe you will agree that considering the urgency of the situation today we cannot well do more."

Quartermaster General wants new builders list

The Construction Advisory Committee of the construction division, Office of the Quartermaster General, U. S. War Department, is now communicating with the nation's contracting firms who have filed applications with the Quartermaster Corps, in an effort to bring these files up to date. This work is not being done with the idea of considering firms on any specific projects contemplated for the near future, but is a general effort to make the files more complete and satisfactory.

The advisory committee has asked that its plans be made known to save many firms considerable expense in sending representatives to Washington in the hope of securing contracts which they might construe to be ready for negotiation, due to the committee's canvass.

• • •

Concrete barge program limited to 15 vessels

The U. S. Maritime Commission has decided to start its program of building concrete barges somewhat more conservatively than originally intended by limiting the initial construction to fifteen barges—the east, west and gulf coasts to build five each. Actual award of contracts for these barges is expected in about a week. Meanwhile, the commission has developed two alternative types of contract to be used, one a modified form of fee contract, while the other is a lump-sum contract incorporating an escallator clause. Contractors will be offered their choice between the two forms.

The "cost-plus-a-variable-fee" contract is designed to give the contractor the protection of a cost-plus contract, but at the same time to offer him an incentive to hold the costs down. Under this contract an estimated unit cost per vessel is

(*Continued on p. 82*)

New and old presidents of the A.A.S.H.O.

G. Donald Kennedy (right), state highway commissioner of Michigan, new president of the American Association of State Highway Officials, accepts the president's gavel from J. S. Williamson, chief highway commissioner of South Carolina and retiring president. Transfer of the gavel took place at the close of the association's annual meeting at Detroit, Mich., Oct. 2.

Houston citizens approve record city bond issue

Despite defense priorities and other abnormalities of 1941, the citizens of Houston, Texas, Oct. 4, by a vote of more than two to one, approved a bond issue for improvements totalling $8,470,000. This is the largest bond issue in the history of the city.

The issue is broken down as follows: sanitary sewers, $2,500,000; storm sewers, $1,400,000; permanent paving, $700,000; flood control, $1,000,000; airport improvements, $800,000; bituminous paving, $300,000; tuberculosis hospital, $650,000; street work, $600,000; fire alarm extensions, $320,000; traffic control devices, $100,000, and parks and recreation centers, $100,000.

No increase in the city's tax rate is planned, as Houston is retiring $2,000,000 or more annually in city bonds paying interest rates as high as six percent and averaging more than four percent annually.

Slightly larger amounts of new bonds with a lower interest rate can be issued each year without raising the tax rate or assessments, it is believed.

In order to provide time for the proper financing of the bonds and efficient execution of the entire improvement program, it is planned to schedule the work over a period of three years, according to Houston officials.

JOBS OF THE WEEK

FOUNDATIONS FOR ALUMINUM PLANT, Massena, N. Y.

P. J. Carlin Construction Co., New York, N. Y., has been awarded a contract by Aluminum Co. of America, Pittsburgh, Pa., for constructing the foundations for 66 buildings for the manufacture of aluminum. The estimated cost of construction is $1,000,000.

DRYDOCK, Pearl Harbor, T. H.

Pacific Bridge Co., San Francisco, Calif., has been awarded a $15,720,000 contract on a cost-plus-fixed-fee basis for constructing a drydock, power plant, moorings and additional facilities at the Pearl Harbor Navy Yard for the Bureau of Yards & Docks, Washington, D. C.

BLAST FURNACE, Gadsden, Ala.

Rust Engineering Co., Birmingham, Ala., will build an 800-ton blast furnace and a group of battery coke ovens for the Republic Steel Corp., Gadsden, Ala. Total estimated cost of the work is $10,000,000. C. A. Thayer, Cleveland, Ohio, is chief engineer for Republic Steel.

MILL CREEK PUMPING STATION, Cincinnati, Ohio

F. J. Robers Construction Co., Burlington, Wis., and LaCrosse Dredging Co., Minneapolis, Minn., have been awarded the contract for constructing the Mill Creek Pumping station and appurtenant works, including a barrier dam and a section of the west floodwall. The U. S. Engineers, Cincinnati, Ohio, took bids Sept. 30 and the Robers firm bid low with a bid of $2,439,642.

STORAGE DAM, Lake St. John District, Que.

Dufresne Construction Co., Ltd., Montreal, Que., received the contract for constructing the storage dam on the Peribonka River at a point known as Pass Dangeruese in the Lake St. John District. The reservoir is being built by the Province of Quebec to increase the flow of water at the power plants on the Saguenay River, center of Canada's aluminum industry. Its cost will be $3,000,000.

PREFABRICATED DWELLINGS, Elmhurst, Ill.

Steel Building, Inc., Chicago, Ill., got the contract for 600 sheet-steel prefabricated dwellings which are estimated to cost $2,500,000 from A. W. Komanch & Co. American Rolling Mill Co., Middletown, Ohio, did the prefabricating work.

ROAD, Pennsylvania

Hempt Brothers, Camp Hill, Pa., has been awarded a $679,639 contract for constructing a length of reinforced concrete paving and three reinforced concrete structures on Route 42, and traffic Route 140 in Germany, Union, Mount Joy, and Cumberland Townships, Adams County, Pa. The Pennsylvania State Highway Department, Harrisburg, T. C. Frame, Harrisburg, chief engineer, is doing the work.

HOUSING, Kansas City, Kan.

J. E. Dunn Construction Co., Kansas City, Mo., was low bidder for constructing 350 defense housing units when the Public Buildings Administration, Washington, D. C., took bids. Lowest bid on Schedule No. 1 was $1,387,242; and that on Schedule No. 2, $1,536,842.

AIR TRAINING CENTER, Santa Ana, Calif.

Griffith Co., Los Angeles, has been awarded contract to construct temporary buildings at Army Air Corp Training Center by U. S. Engineers, Los Angeles. The successful bid was $2,016,181. This is later news than contained in the construction reports pages of this issue.

ROAD, Pennsylvania

Pennsylvania State Department of Highways, Harrisburg, Pa., received lowest bid from C. W. Good, Inc., Lancaster, Pa., for 38,696 ft. of reinforced concrete paving on Legislative Routes 148, including two reinforced concrete bridges, 2 overpass bridges on section 4-A, 137 Traffic Routes 222 and 322 in Ephrata and East Cocalico Townships, Lancaster County, at $839,675. T. C. Frame, Harrisburg, is chief engineer for the highway department.

HOUSING PROJECT, Clairton, Pa.

Dick Construction Co., Pittsburgh, Pa., has been awarded contract for constructing 11 apartment buildings and 18 housing units by the Division of Defense Housing, Washington, D. C., at a cost of $1,260,000. Charles M. and Edward Stotz, Jr., Pittsburgh, Pa., are architects.

HOUSING PROJECT, Dallas, Tex.

Will O'Connell, Austin, Tex., has been awarded a $778,565 contract for construction of the Cedar Springs Place slum clearance project for the Dallas Housing Authority. A. E. Thomas, W. Sharp, and E. Welch, Dallas, are architects for the project and R. O. Jameson, Dallas, is structural engineer.

NOTE—Additional bidding and contract news on over 800 projects large and small appear in the Construction News section beginning on page 207.

Many proposed programs studied as post-war planning work continues

Administration to ask for about $50,000,000 in near future to start planning. Huge rehabilitation program for American cities would be carried out by one plan.

Since last January when President Roosevelt put forward the principle of a "reservoir" of public works projects to be prepared now for construction after the war, nearly every federal agency concerned with construction or finance has been studying the problem. Congressional action is likely within the next few months on a half dozen pieces of legislation aimed at setting up the machinery to create such a reservoir.

Hearings are expected sometime this month on the Wagner-Beiter bill, which is the underlying measure to finance the program. Administration-supported, this bill would authorize appropriation to the President of funds to finance preliminary engineering work. The money would be distributed through the Federal Works Agency or any other agency the President might designate. Part would be allotted to federal agencies and part would be loaned to state and local bodies with the idea that the loans be repaid if and when the projects are actually built. No specific sums are mentioned in the bill. National Resources Planning Board, which is coordinating all the federal studies of post-war public works, has recommended that a reserve total of two to two and a half billion in non-federal public works —about equal to a normal volume of state and federal construction in the pre-depression years. This would require appropriation of some $100,000,000 for planning work. It is understood that the administration expects to ask immediately for about $50,000,000.

More limited in its objectives is the provision in the defense road bill making $10,000,000 of federal and a like amount of state money available for engineering work on major highway projects—particularly express roads through cities—to be built after the war. Passed once, and vetoed for reasons having nothing to do with this provision, the bill has passed the Senate again and is pending in the House.

Hearings are also to start this month on a bill by Senator Thomas of Utah to create a new public works agency consolidating the functions of the WPA and PWA. Known as the Public Works Projects Administration, it would be charged with designing, financing, and constructing federal and non-federal public works, either by contract or force-account. Senator Thomas is chairman of the Senate committee on education and labor, but he has as yet had no indication of administration attitude towards his measure creating a new agency.

Aimed specifically at building up a reservoir of authorized federal projects are the flood control and river and harbor authorization bills. The President last August signed a measure authorizing $267,000,000 in flood control jobs, most of which, he said, will not be built until after the war. A House committee is expected to soon report out a river and harbor bill authorizing projects totalling nearly a billion.

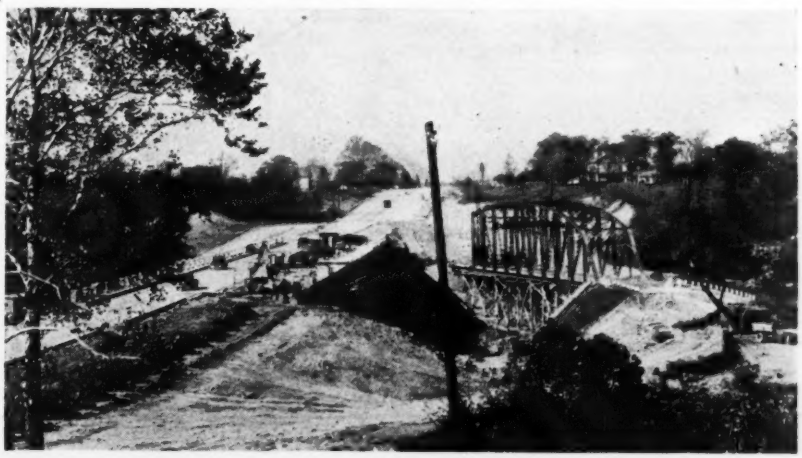
A scheme considerably more sweeping than any of these is aimed at stimulating a huge program, both public and private, for the physical rehabilitation of American cities. This has not yet been put in the form of legislation, but it is under active discussion in the administration and may well reach Congress next session. Based on studies made for the Federal Reserve Board by A. H. Hansen and Guy Greer, this plan starts with the view that rehabilitation of blighted areas in cities is prevented by land values which have been inflated by speculation and by zoning of over-large areas for commercial and industrial uses. Before reconstruction is practicable, it is argued, these values must be scaled down; and, because there is no one else to do so, the federal government will have to bear at least a substantial part of the losses involved.

Under the scheme, cities would buy the run-down and slum areas if necessary, at something like present market prices. Funds provided by the federal government would be used for this work. The government would be repaid only in a percentage of the income later derived from the land. The cities would keep perpetual title to the land, using it in part for public purposes, but mostly granting long term leases to private individuals. Rentals charged would be sufficiently low to make private building on the leased land an attractive investment.

Other facets of the scheme involve creation of a modified form of FHA insurance on the entire investment for private rental housing, extensive federal research in the technic and organization of private building, and a revived public housing program.

Participation in the scheme by municipalities would be conditional on their adopting an approved civic plan.

In addition to the federal legislation required, this plan would, of course, necessitate major changes in state laws and possibly constitutions to give municipalities the needed land-acquisition powers.



Old Ohio bridge removed with new span in use

Two lanes of the new four-lane concrete bridge being constructed over Big Darby Creek on U. S. Route 40 ten miles west of Columbus, Ohio, were opened to traffic October 2. The other two lanes are soon to be ready for use and the old replaced single-span truss bridge at the right is already being torn down. The latter bridge, which was built in 1914, is being removed to Coshocton County where it will be reassembled across the Tuscarawas River on Route 75. The dismantling work is being done by C. R. Bolton, general contractor of Columbus.

The new structure 513 ft. in length overall, including two 150-ft. arch spans, (ENR Dec. 12, 1940, p. 789), is part of four-lane highway improvement from the west corporation limits of Columbus to West Jefferson.

Robert J. Dienst, Columbus, is the general contractor for the new highway, while Visitine & Co., Columbus, as subcontractor built the new bridge. All the work is for the Ohio State Highway Department, for which Hal G. Sours is director; Wm. S. Hindman, bridge engineer; T. W. Kinnear, construction engineer; and C. C. Hurlbut, resident engineer.

Defense work is A.S.C.E. meeting topics

(*Continued from p. 75*)

have got to do more, a great deal more, if we are not to end up by having to fight the whole world alone and unaided. The army is getting ready to play for keeps."

Board of direction actions

While recognizing the services of engineers in the long-established departments of the federal government, the board of direction expressed concern over the extension of work of these departments into fields of engineering new to them, with consequent sudden enlargement of staff and delegation of skilled supervision, which "cannot but lead to inferior performance." The reported movement to build up engineering forces within government agencies is "inimical to the best interests of the engineering profession and is not conducive to the most efficient utilization of the engineering talent of the country." In objecting to the proposed socialization of the engineering profession, the board formulated the following principles: (a) America will best be served by the use of engineers in private practice, in state and city departments, and in the utilities; it will not be best served by the assemblage of these engineers into federal service on a salary basis; (b) The engineering profession and engineering talent will suffer if engineers who now are, or recently were in practice, are to have their normal opportunities absorbed by the federal government; and (c) Engineers, whatever the form of remuneration, are entitled to adequate compensation for their services.

Looking ahead to the post-war period the board listed the following principles as necessary in any program of public works:

Advance planning is most essential and requires time.

The revival of PWA or establishment of a department in the RFC, and continuance of PRA, to administer a program of post-war construction, is strongly recommended.

A comprehensive list of construction projects throughout the nation should be developed for analysis and use as conditions warrant, all to be judged carefully as to immediate need, future worth and economic soundness.

Selection of projects for actual planning and construction should meet the rigid examination and approval of a strong and competent technical federal board of review, representing PWA or the RFC and the PRA.

Actual planning and work on these projects should be executed only by the local agencies responsible for same, namely, the state, county or city in which the project is located.

Federal funds should be appropriated at the proper time to permit development of adequate plans and specifications for projects meeting the approval of the technical federal board of review.

Plans for approved projects must be prepared only by qualified, competent and experienced engineers selected by the local agency which is to execute the work, such as engineers of state, county and city departments and those in private practice.

Construction of all approved projects must be carried out by competent and experienced contracting organizations, following the accepted principles of competitive bidding, established costs, and definite placement of responsibilities.

Effective planning requires thinking in advance of the emergency, not after the crisis is reached.

The executive committee directed the secretary to protest to SPAB against the action taken Oct. 9 to restrict civilian construction. The committee stated that it "realizes the urgent need of critical materials in national defense, but, on the other hand, believes that the sudden and universal stoppage of civilian construction is not warranted. It is respectfully suggested that priorities of types of civilian construction be carefully analyzed and that priorities be applied progressively as truly necessary."

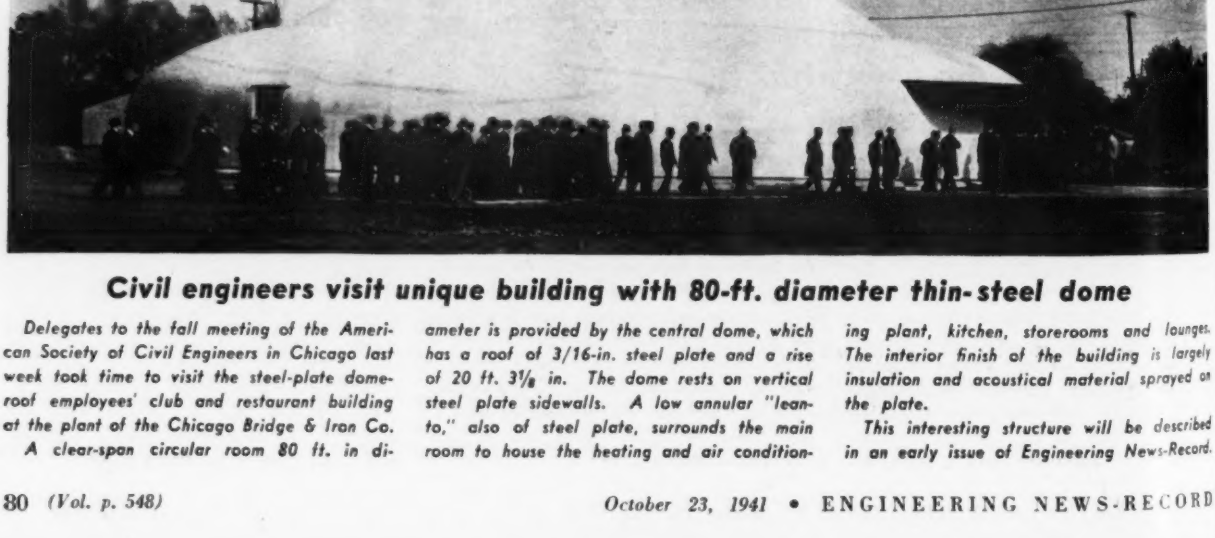
The board appointed a committee consisting of Chas. M. Spofford, Jas. H. Cissel, Frederick N. Farquarson, Frank M. Masters and Homer R. Seely to study official reports on the failure of the Tacoma Bridge. The committee, at its first meeting, broadened the scope of its activities to present conclusions of its own. Another committee was appointed to consider the problem of unionization of engineers, to make a report at the next January meeting.

Establishment of a local section at Fort Belvoir, Va., was authorized. At present more than 80 members are stationed at the Fort, which is field headquarters of the Corps of Engineers.

The following were selected as honorary members of the society: Ralph Budd, William Kelly, Henry Earle Riggs, John Lucian Savage and Henry Matson Waite.

Technical session

In the eight technical sessions, a total of 18 papers and several written discussions were presented, largely devoted to Chicago's important engineering problems and centering on express highways, sewage and water treatment, subways, land-use trends and waterways. Of somewhat broader significance were two papers on soil mechanics by W. S. Housel (University of Mich.) and Karl Terzaghi (Harvard), which revealed correlations between laboratory theory and field results. Prof. Housel's paper told how



Civil engineers visit unique building with 80-ft. diameter thin-steel dome

Delegates to the fall meeting of the American Society of Civil Engineers in Chicago last week took time to visit the steel-plate dome-roof employees' club and restaurant building at the plant of the Chicago Bridge & Iron Co.

A clear-span circular room 80 ft. in diameter is provided by the central dome, which has a roof of 3/16-in. steel plate and a rise of 20 ft. 3⅛ in. The dome rests on vertical steel plate sidewalls. A low annular "lean-to," also of steel plate, surrounds the main room to house the heating and air conditioning plant, kitchen, storerooms and lounges. The interior finish of the building is largely insulation and acoustical material sprayed on the plate.

This interesting structure will be described in an early issue of Engineering News-Record.

earth pressure re-distribution on Detroit's Central Ave. water supply tunnel in blue clay continued for 5 years, during which time the pressure cell results followed predicted values within a 10-percent error.

Prof. Terzaghi described how the decision to use shield instead of liner plate construction in the Chicago subway in the business district was based on studies that assumed the active shear strength of the clay was equal to one half the compressive strength of unconfined samples. Careful measurements during construction justified the decision. Another assumption, namely that the ratio of lateral to vertical pressure is between one-third and two-thirds, was also supported by the field measurements. Based on what was learned, it is believed that a much thinner subway wall than the one adopted could have been used safely. Future designs for tunnels in clay should benefit greatly from the Chicago subway soil mechanics studies, according to Prof. Terzaghi and others who discussed the paper. Pressure measurements on the open cut subway sections, which will form the subject of an *ENR* article in the near future by Ralph B. Peck of the Chicago department of subways and traction, were discussed in the construction division meeting by Mr. Peck.

Defense construction described

What the construction forces of the armed services are doing for national defense was outlined in a group of three papers by Col. Edmond H. Leavy, Quartermaster Corps., U. S. Army, Capt. J. J. Manning, C.E.C., U. S. Navy, and Col. David McCoach, Jr., Army Engineer Corps. Col. Leavy in describing the immense program of cantonment, ordnance plant and warehouse construction pointed out that 22 more cantonments are in the planning and design stage. The Corps of Engineers is charged with responsibility for $1,600,000,000 worth of construction during the current fiscal year, according to Col. McCoach, about half of which is for Air Corps facilities both in this country and the island bases. Harbor and flood control work of defense status totals $141,000,000, and fortifications account for another $50,000,000. Improvement of civil airfields for military use has called for $81,000,000 in the past two years, and another $80,000,000 is being expended on four huge bomber assembly plants. Col. McCoach revealed that a 12-mile railroad line involving 3½ miles of tunnel in Alaska is underway, which when completed will eliminate a 66-mile line mostly on piling.

In outlining the tremendous construction job of the Bureau of Yards and Docks, Captain Manning emphasized the Navy Department's complete satisfaction with the cost-plus-fixed-fee contract and paid tribute to the engineers and contractors who have helped to make it work. A total of 150 such contracts totaling $860,300,000 is in force. More fee contracts will be made although it is still the bureau's basic policy to use lump-sum competitive contracts whenever time and the nature of the job permit them. Capt. Manning revealed that some of the new Navy Yard drydocks will permit building battleships of 55,000- to 70,000-ton size. Using docks instead of ways permits the ship to be built on an even keel, which simplifies framing; permits weights to be rolled aboard ship instead of being lifted, and eliminates the cost of launching. These new drydocks, 1,000 ft. long, 150 ft. wide and 45 ft. deep, are the largest in the world. Two of them, at Philadelphia and Norfolk, are built entirely of tremie concrete, an unprecedented use of this method of construction. Others use various types of cofferdams, so that the drydock work as a whole represents one of the largest, most varied and spectacular construction programs ever undertaken.

Leading a symposium on civilian protection in war time was a report by Walter T. Binger, of New York, and chairman of the National Technological Civil Protection Committee, who has just returned from England. He gave eyewitness accounts of the effect of bombing on buildings, railroads, utilities and the people. Of greatest importance, he stated, was the decision by British authorities at the start to make repairs to utilities, roads and railroads permanent instead of temporary. Otherwise at the end of hostilities the whole country would have to be rebuilt. He outlined how repairs were made after damage by bombing, stating that the repair program is being carried out "by organization and by nerve." American cities, he said, would stand air raid attacks far better than have the British buildings, for over there fireproofing of buildings is practically non-existent, or at best rudimentary. Our steel-frame structures would stand up much better than the brick construction of England, he said.

• • •

Philadelphia water probe ordered by President

At the request of President Roosevelt, Federal Security Administrator Paul V. McNutt has started a probe to see whether the water and sewerage facilities in the city of Philadelphia are a menace to defense work and defense workers. For the past several months Philadelphia has attempted to obtain funds for water and sewage improvement by passage of special bond issues. However, twice the Pennsylvania State Supreme Court has held invalid proposed bond issues for sewage disposal improvements at Philadelphia (*ENR*, Oct. 9, 1941, p. 473).

Use of copper banned for building work

Building supplies output to stop Jan. 1, as a 750,000-ton over-all copper shortage is seen for 1942.

Most use of copper in building construction after Nov. 1 was forbidden this week by the Priorities Division of OPM and manufacture of copper building supplies is to be stopped Jan. 1. In a new approach to the control of scarce materials, the division issued a long list of copper uses which are shortly to become illegal. It is already nearly impossible to obtain copper without a priority rating, but the present order is aimed at the user who already possesses an inventory of copper; it will force him either to put his copper on the market or make it last longer for his own uses.

After Nov. 1, no copper or copper alloy sheet, strip, or screening may be used for any purpose in connection with building construction except maintenance of copper installations on existing buildings.

Use of copper in the manufacture of a long list of building and plumbing supplies and hardware is also forbidden after Jan. 1, and meanwhile is restricted to 60 percent of last year's rate of use.

Apart from sheet, strip, and screening, however, the restriction is on the manufacturer rather than the constructor. If a builder can locate some copper tubing, hardware, or the like, there appears to be nothing to prevent him from installing it.

Restrictions in the order do not apply to defense work where copper is specified, since copper has already been practically excluded from defense housing by the housing priority plan.

Copper is rapidly and rather suddenly becoming one of the chief shortages—more serious in many ways than aluminum. This month the supply of copper (138,700 tons) is inadequate even to fill all orders with priority ratings, and during 1942 an over-all shortage of at least 750,000 tons is anticipated.

This week's copper order emphasizes the extent to which material shortages are becoming a controlling influence on the design of structures. Applications for project ratings are now regularly scrutinized to determine whether a minimum use is being made of scarce materials. Thus a good many applicants have been required to redesign steel structures for reinforced concrete as a condition for the issuance of a rating. All decorative use of metal is forbidden.

There is as yet no universally accepted rule as to how much and what material a builder may use. A manual on the subject is now being prepared by OPM's new Division of Conservation, and when it is completed it will govern.

Concrete barge contracts

(*Continued from p. 77*)

set up. This cost is broken down into estimated monthly payments divided between labor and material expenditures. Monthly, thereafter, the estimated cost will be adjusted according to the fluctuation of the Bureau of Labor Statistics index of hourly earnings in durable goods manufacturing industries and the bureau's index of wholesale metal prices.

As the work progresses, the contractor will be paid his actual costs, including overhead "incident and necessary" to the job. At the completion of each vessel he will receive a fee of 15 percent of the adjusted estimated cost. If the actual cost plus the fee is greater than the adjusted estimated cost, that is that. If, however, the actual cost runs lower than the estimate, the contractor receives half of the savings. Total of cost savings allotted to the contractor plus bonuses or minus penalties is limited to seven percent of the estimated cost. A time schedule will be written into the contracts. Liquidated damages of $50 daily will be charged for failure to meet the schedule, and a like sum will be paid as a bonus if the schedule is exceeded.

The commission may cancel the contract upon payment to the contractor of his actually incurred costs plus ten percent of the costs or six percent of the estimated total cost times the percentage of completion achieved at the time of the contract's cancellation—whichever of these two quantities is smaller.

The lump-sum form of contract provides for the establishment of a unit price per vessel to be paid the contractor. This price is to be adjusted for variations in material and labor costs in the same way as is the estimated cost figure in the variable-fee contract already described. Provision is made for liquidated damages, but there is no bonus for early completion. If the contract is cancelled by the commission, the contractor will be paid for work accomplished in terms of a percentage of the contract unit price and will also be paid any cancellation fees he has to pay to his suppliers and subcontractors.

The contractor's profit under the lump-sum contract is limited to ten percent of the contract price, and any excess must be turned back to the commission.

OBITUARY

GEORGE BURRILL STONE, civil engineer employed by the Tampa Shipbuilding Co., Tampa, Fla., died at Palmetto, Fla. Oct. 10. Mr. Stone had also been employed recently by the U. S. Engineers, Vicksburg, Miss. Earlier in life Mr. Stone worked for the Atlanta, Knoxville & Northern, the Southern and the Atlanta, Griffin & Macon Electric railways. Later he was employed by the Oregon Short Line and the Idaho Northern systems.

THOMAS DEVANY, 54, executive vice president and a director of Ulen & Co., construction engineers, died Oct. 13 at Forest Hills, N. Y.

CHARLES D. BECKWITH, 69, New York highway contractor and a pioneer in the use of modern types of asphalt paving, died at New Rochelle, N. Y. Oct. 10. Formerly his firm was known as the Union Paving Co. but during the last 20 years had done business under the name of C. D. Beckwith Corp.

J. H. KENYON, 61, of Raleigh, N. C., and construction superintendent for the Dixon Construction Co., Fayetteville, N. C., was killed in an automobile accident near latter city Oct. 13.

CLYDE E. HEALY, 60, assistant city engineer of San Francisco, died in that city Oct. 12. Mr. Healy joined the city engineer's office in 1909 and for the last several years had been in charge of all state-sponsored WPA projects. Following graduation from the University of California in 1908, he worked as surveyor for the Union Oil Co.

CARL O. NYBERG, prominent highway and railroad contractor of Spokane, Wash., died Oct. 11 at Libby, Mont., of injuries suffered in an automobile accident.

WILLIAM A. FLANNERY, chief engineer of the New York City department of water supply, gas and electricity, died Oct. 18.

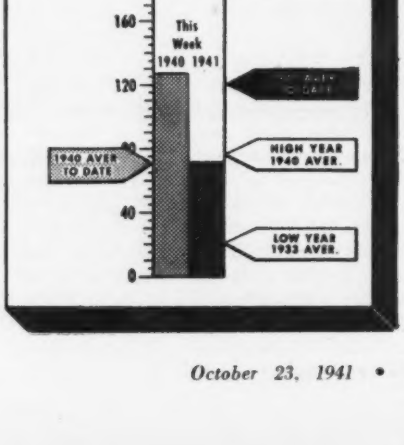
CONTRACTS AND CAPITAL

ENGINEERING CONSTRUCTION awards for the week, $70,326,000, top the $42,944,000 reported for the short preceding week, but are 45 percent lower than in the corresponding week last year.

Private and public awards are both lower than in the 1940 week, private is off 54 percent, and public, 41 percent. State and municipal awards decline 29 percent from the week last year, and federal work decreases 47 percent.

The current week's award total brings 1941 construction to $5,147,515,000 for the 43-week period, an increase of 69 percent over the period last year, and 29 percent greater than the $3,987,000,000 reported for the entire year 1940. Private construction for the 43 weeks is 16 percent greater than in the 1940 period, and public is 90 percent higher as a result of the 208 percent gain in federal work.

New construction financing for the year to date, $5,930,530,000, is 68 percent above the $3,523,763,000 reported for the 43-week period a year ago.



CONTRACTS

(Thousands of dollars)

	Week Ending Oct. 24 1940	Oct. 16 1941	Oct. 23 1941
Federal	$ 63,715	$15,341	$33,665
State & Municipal	29,211	15,258	20,730
Total public	$ 92,926	$30,599	$54,395
Total private	34,391	12,345	15,931
TOTALS	$127,317	$42,944	$70,326
Cumulative 1941 (43 weeks)			$5,147,515
Cumulative 1940 (43 weeks)			$3,048,961

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	1940 43 weeks	Cumulative 1941 43 weeks
NON-FEDERAL	$1,241,802	$1,104,412
Corp. Securities	214,340	320,871
State & Mun.	427,325	382,281
U.S.H.A. loans	180,465	30,399
R.F.C. loans	195,672	107,361
R.E.A. loans	40,000	100,500
Federal Air—Hwy.	184,000	163,000
FEDERAL	$2,281,961	$4,826,118
TOTAL CAPITAL	$3,523,763	$5,930,530

FHA MORTGAGES

	Week Ending Oct. 19 1940	Oct. 11 1941	Oct. 18 1941
Selected for appraisal (Titles II and VI)	$24,517	$26,805	$22,995*
Cumulative 1941 (42 weeks)			$1,194,682*
Cumulative 1940 (42 weeks)			$1,064,330

* Subject to revision.

ENR INDEX NUMBERS

		1913	1926
Index Base=100			
Construction Cost	Oct. '41	264.46	127.13
Building Cost	Oct. '41	215.92	116.72
Volume	Sept. '41	419	184

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Bombs on British Factory Roofs

Sir: In reply to your inquiry I have been turning over in my mind what I could write about the effects of bombing that would pass the censor. My interest has been confined largely to the effect of air raids on roofs, particularly of factory buildings. On the whole the German air raids have been notably unsuccessful in damaging British industry. For example, our company had supplied protected metal corrugated steel for something like 30,000 buildings in the 18 years before the war yet so notably unsuccessful has the bombing been that we have only had to replace about 2¼ percent of this material; at the same time we have installed five times as much material in new roofs.

In Britain most factories are roofed with corrugated galvanized and protected steel, corrugated asbestos cement, slates or asbestos cement tiles and glass, all supported by structural steel. Some hold that in the case of a direct hit there may be less damage to the steelwork and to the machinery and interior of the structure, if the roof and walls are of material that can be easily shattered and blown away, and that a steel roof, affording greater resistance to the blast, would enable the explosion to develop greater power and would result in much greater interior damage. There is perhaps a certain amount of truth in this, but unfortunately it is also true that bombs falling some little distance away from a slate, glass or asbestos-cement roofed building will strip the roof off in circumstances that would result in the steelroofed building coming through without damage other than from chunks of débris falling on it.

There is no question but that the use of brittle material very greatly enlarges the size of the target that the enemy has to hit.

The bombs dropped are in various sizes from 50 kilos up to 1,000 kilos and heavier. As it is not possible to determine what size has fallen on a particular building, it is not easy to generalize about their behavior. A 50 or 100-kilo bomb falling in sand may do little or no damage even to the windows of a building 75 ft. away, while if it falls on very hard ground, the horizontal blast may be very destructive. It seems impracticable to construct buildings that will resist a direct hit from even a 50 kilo bomb.

RALPH ST. L. PEVERLEY
British Representative
The H. H. Robertson Co.,
Ellesmere Port, Cheshire, England

Add Another Author

Sir: It had been the intention to ascribe joint authorship to the article "Offset Shooting for Foundation Exploration," which was published under my name in *ENR* July 17, 1941, p. 110. The other author whose name should have appeared is James P. Hawke, who at the time the article was prepared was junior engineer, U. S. Engineer Office, Little Rock, Ark.

RICHARDS M. STROHL
Mountain Home, Ark.

Grouting with Chemicals

Sir: The article on chemical joint sealing (*ENR*, Aug. 14, 1941, p. 222) recalls that in an earlier article (*ENR*, Aug. 17, 1939, p. 221) chemical solidification of soil, is attributed to a French inventor, Charles Langer, without mention of the fact that an American engineer made some definite contributions to this special foundation method.

Lars R. Jorgensen, whose name is well known in this country and abroad for his improvements and achievements in arch dam design, made extensive studies in the field of chemical solidification during the ten years preceding his death in July, 1938.

At an early stage of his studies, he realized that previous difficulties in controlling time of set of the chemicals must be overcome and he worked on the plan of injecting the two chemicals, usually sodium silicate and calcium chloride, simultaneously.

His first patents, "Methods of Grouting by Chemical Means," applied for in 1933 and granted Dec. 31, 1935 (No. 2,025,948), include some improvements of the French invention, especially the injection of the solution of both important chemicals and the introduction of certain substances before injecting the solution in order to lengthen the time interval of setting.

J. J. POLIVKA
University of California
Berkeley, Calif.

Doubtful Aid to Private Building

Sir: *ENR*, Aug. 14, 1941, p. 236, carried an article "Slum Clearance Expedited by New State Laws." This refers to the Desmond-Mitchell Act and is known as the Urban Redevelopment Bill.

In the bill so many barriers are set up against free enterprise that it is self-nullifying and can hardly result in slum clearance by persons who have been in the building business. Private enterprise can not function under this bill because it provides among other things:

1. That a part of the cost of a development is to be a charge for alleviating hardship to families occupying dwelling accommodations in the development area.
2. That developer must find legal accommodations at similar rentals before procuring a certificate permitting the commencement of the development from the local authority.

It is recognizable that the above requirements would make a relief bureau out of a redevelopment corporation. There are other provisions which leave very little liberty to the equity investor. The risks are unlimited while the maximum profit which a developer can earn is about 5½ percent on the equity investment.

This bill would have been workable if the affirmative parts of the law only would govern. These include certification of an area to be cleared; an approval by the Planning Commission; and privilege of condemnation after 51 percent of the property has been acquired. Such affirmative provisions would bring in the talent which has built more than 99 percent of the dwelling accommodation in this country.

It is extremely difficult for private enterprise to operate under the continuous supervision of agencies which have the right of veto but which share no responsibilities in the financial losses.

JACOB MARK
Consulting Engineer
New York, N. Y.

EDITORIALS

VOLUME 127 NUMBER 17

October 23, 1941

Progress Despite Pressure

IT MIGHT BE SUPPOSED that the high speed demanded in defense construction and the correspondingly high pressure under which designers have to work would tend to throttle ingenuity and conventionalize the product. On the contrary, as the articles on defense factories that have appeared in these pages in recent weeks make plain, progress continues despite the speed and pressure. That it also extends to the buildings planned by and for the army and navy construction branches is emphasized by a special group of articles in this issue. Here is evidence that despite the pressure of time ingenuity in design, in use of new materials and in construction is playing a surprisingly large part in the current defense effort.

Many New Elements

NOTABLE FOR THEIR VARIETY are the new trends and developments recorded in the structures described in this issue. Sometimes it is merely a desires for improvement that educes a new design. In other cases the special requirements of the structure itself may dictate a novel design approach. Thus timber framing appears in new forms, steel trusses reach remarkable spans or concrete arches appear in buildings that have heretofore been of more conventional type. The need for shatterproof walls leads to the incorporation of steel reinforcement in brick walls or to the development of walls of pressed steel plates. The desire to reduce the noise of bomber assembly operations requires acoustical control on a large scale. Insulation ingenuity is demanded to keep the cost of necessary air conditioning within reason. Recognition of the worker efficiency that goes with good lighting results in the design of reflecting wall and floor surfaces, the former with fiber glass sheets, the latter with white cement, or it leads to the use of glass block that contains light-directing prisms. Economy, appearance and weather resistance dictate the use of baked enamel steel window sills and awnings, exposed aggregate panels of precast concrete or chemically treated plywood for exterior walls. The list is long and spectacular. It also is gratifying, for it indicates that design is not static, that engineers are still ingenious and that manufacturers are awake and aggressive. Coupled with the speed and efficiency of the construction man, such a combination is bound to succeed, for it forges its own future.

New Construction Materials

NEW MATERIALS are beginning to appear to take the place of those denied to construction by priority and scarcity. Their introduction, however, is not always easy because the prospective user's experience with extravagant claims in the past has made him a cautious buyer. One avenue of aid is through the standard materials specifications. The American Society for Testing Materials, for example, has initiated a scheme for speeding approval of new specifications or of making temporary emergency revisions of existing standards. The federal government also is permitting the use of optional emergency specifications in place of many of its established standards. If a new material can be admitted under an authoritative specification it is usually widely acceptable. But such formal procedure is not always possible. Here, the engineer user can help himself by devising accelerated tests for quality, by making trial installations, by tempering natural caution with curiosity and ingenuity. He can also take the initiative in urging the promulgation of temporary specification changes or building code revisions that seem justified in an emergency. In the days to come new materials have an important part to play. Their use should be fostered whenever possible.

For Lack of Policy

LACK OF A DEFINITE AND FIRM POLICY with respect to organized labor is responsible for all the turmoil centering around the government's refusal to award the contract for defense housing at Detroit to the Currier Lumber Co., low bidder for the job. On one side are those who say that Sidney Hillman of the OPM, in ordering John Carmody of the Federal Works Agency not to award the contract to Currier, is but following a policy of throwing defense work to the dominant union in any field as a means for keeping the AFL and CIO from invading each other's recognized fields of activity during the emergency, a policy that was implicit in the stabilization agreement signed between the AFL building

trades and the OPM last July. On the other side are those who say that Hillman is simply giving substance to a secret agreement entered into with the AFL building trades last July as part of the price for their signature on the stabilization agreement. What the public sees is a low bid thrown out because the AFL building trades threaten to tie up a large amount of defense construction by strikes. No such threat would have had a chance of success had the government laid down a definite defense labor policy months ago. Hillman may have such a policy in mind but until it is written down in black and white where all can read it and all who would suffer by its application can have their say in court, we will have more labor troubles rather than less. Possibly a sound labor policy would dictate withholding the housing contract from Currier, but until the construction industry knows what the policy is and how it is to be applied by the OPM it cannot be expected to support Mr. Hillman's stand.

What the SPAB Ruling Means

CONSTRUCTION MEN quite generally appraise last week's SPAB announcement on non-defense construction priorities as merely official recognition of an existing situation. Anyone who has had anything to do with non-defense construction over the past few months could hardly do otherwise. The so-called critical materials such as steel, copper, brass and zinc are becoming more and more difficult to obtain without priorities, and even priorities are of little help on some jobs. Thus it cannot logically be said that the SPAB order bans non-defense construction; the first draft of the banishment order was written in midsummer by growing shortages of materials and lack of private investment support.

On the negative side, the SPAB order doubtless will check the inauguration of many non-defense projects that might still have been started in the faint hope that needed critical materials could still be obtained. This check may not be entirely without beneficial aspects because canceling of plans may keep contractors from making commitments that they could not meet without serious loss.

Private housebuilding, water supply, sewers, streets, river and harbor work and irrigation are, of course, going to suffer. But their curtailment was a fact ere now. Highway construction may be cut, but much of it is entitled to defense priority, and unreinforced concrete and asphalt surfaces can be built without priority aid. Even water supply and sewers that are essential to the health and safety of the civilian population are for this reason entitled to priorities on materials.

On the favorable side is the fact that the new SPAB policy will aid in completion of projects that are well under way. These projects will get priorities to which they were not entitled before the order was issued.

It is reported from Washington that SPAB considered a complete ban on non-defense construction in an attempt to force stocks of critical materials into defense channels, but abandoned the idea. That the SPAB has the power to issue such an order is open to question, but whether or not it has such power the conclusion seems obvious that the confusion that the order would create would be so great as to far offset any possible advantage. Normal non-defense construction must be curtailed as a check to inflationary tendencies, but, ideally, the curtailment should only be enough to offset the men and materials absorbed by the defense activity.

Pessimists would do well to recognize that we are in the midst of a record-breaking boom in construction, which is predominantly a result of defense work; of the $4,900,000,000 worth of contracts reported by *ENR* in the first nine months of 1941, some 75 percent was in the defense category. Furthermore the boom is far from spent, and a drop of as much as a third at some future date would only bring the volume down to that of such reasonably good construction years as 1937 and 1938. Furthermore, on its own figures for 1942, the SPAB sets the non-defense construction at two billion dollars, indicating that it recognizes that a large amount of such work must go ahead.

The SPAB ruling of itself is not the great turning point that its newspaper headlines heralded. It merely emphasizes an existing situation that the construction industry has been taking in its stride. Dislocations have been absorbed as they appeared. More are in the offing, and they, too, will require courageous attention. In the meantime the construction industry still has a tremendous job on its hands. It has demonstrated that it can do it. And when the time comes for sacrifices it can make them too, the same as any other industry or segment of our population.

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Fig. 1. Cantilever type and Hiwassee type forms in use at Mahoning Dam on the Allegheny watershed.

Cantilever Forms Preferred at Mahoning

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***Contents in Brief**—Cantilever forms were used and compared at Mahoning Dam with the pipe strut type form developed at Hiwassee Dam by TVA. Cantilevers were about 10 percent cheaper and produced better concrete surfaces. A feature of this cantilever design is a member that supports the forms while the ties are removed thus minimizing the time the raising crew is at the form.*

UNTIL RECENTLY THE CANTILEVER form has not had a great number of enthusiastic users. A writer, in a thorough article on the subject of form costs and design recently wrote, "Attempts to work up a practical cantilever form generally have been abandoned for one of several reasons: (a) weight of panels, (b) difficulties of stripping when using two lifts of panels, (c) lining up form, (d) greater deflection in cantilever form. However, it does not appear that the possibilities for a practical cantilever form are entirely exhausted, and an acceptable design may be developed." Work at Friant and Shasta dams indicates a renewed interest in this subject, *ENR*, April 10, 1941, p. 542, and June 5, 1941, p. 893, and this article describes a practical cantilever form developed in June 1939 by the Dravo Corp., contracting division for use on Mahoning Dam at Dayton, Pa.

Cantilever forms

The cantilever form is especially adaptable to dam construction in which the lifts are limited to a few feet (5 ft. lifts were used at Mahoning); it makes use of steel embedded in previous pours for its support; and it eliminates the tie rods which otherwise interfere with concreting.

A typical example of the cantilever form used at Mahoning Dam is shown in Fig. 2, left. Four-inch tongue and groove vertical sheathing was used, with rolled steel sections for the horizontal and vertical wales. The form rods and stud bolts were made of high tensile steel. Deflection was a governing factor in designing this combination of vertical wales, horizontal wales, and sheathing. In the design a pouring rate of 2½ ft. per hour was assured, but actual conditions were often far more severe than this assumption.

Standard panels for the bulkheads were 16 ft. wide. On the upstream and downstream faces of the dam the panels were made of various widths. The bottom stud bolt, as shown in Fig. 2, has a longer threaded portion than the middle stud bolt in order to accommodate two nuts and washers. The arrangement of these

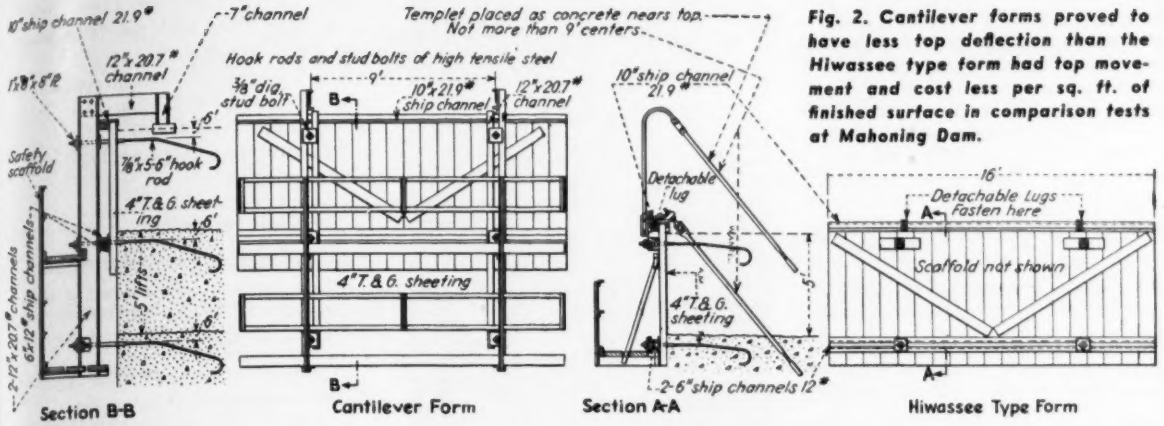


Fig. 2. Cantilever forms proved to have less top deflection than the Hiwassee type form had top movement and cost less per sq. ft. of finished surface in comparison tests at Mahoning Dam.

nuts and washers is such that the top of the form may be adjusted to any position. By tightening one nut the lower end of the vertical wale moves in toward the concrete, which moves the top of the form out. Similarly, tightening the other nut will move the form out at the bottom and in at the top. A very accurate adjustment can then be made in lining up the form. In the design it was thought necessary to include a bracket to transmit the weight of the form to the bottom stud bolt, but practice proved this to be unnecessary and it was soon eliminated.

Bracket holds form

At the top of the vertical wale is attached a detail that contributed greatly in making the cantilever form safe and successful. This is a cantilevered arm that makes the form self-supporting during the stripping operation. As may be seen in Fig. 4 the supporting arm is connected to the form by bolts, the arrangement of which allows an adjustment of position so often necessitated by internal structures or by the change in slope of the concrete face. When the face of the concrete is uniform and there are no internal structures to be dodged this connection may be welded. Experience, however, indicates that an adjustable or bolted connection is desirable.

On the end of this supporting arm is a leg or post which reaches down to the concrete. This can be made an adjustable member or wherever practicable the leg can be welded to the supporting arm. At the bottom of the leg a shoe was constructed so that the leg could be easily pulled from the concrete. After some use it was found that the shoe could be eliminated provided the form watcher would break the bond between the concrete and leg by hitting it lightly as the concrete approached its final set. The position and depth of penetration of the leg are determined by the horizontal forces caused by the form and its load tending to pull outward from the face of the concrete at the top of the pour when all anchor bolts are removed. The supporting bracket is of no value during the setting of the form and pouring of the concrete, its function being only to hold the form so that the ties can be removed without attaching the lifting device to hold the form. The brackets interfered in no way with placing the concrete.

Controlling alignment

Aligning the cantilever form is a simple and efficient operation. Control of the alignment was possible by means of the bottom stud bolt described above. Not only was the alignment process found to be simple but the form was found to stay in line better than other types used. The use of steel washers against steel wales may have been one factor that reduced deflection.

Comparison with Hiwassee form

It was possible to compare the cantilever form with the type found to be so successful on TVA's Hiwassee Dam, shown in Fig. 2, right. On Mahoning Dam both Hiwassee and cantilever types were used during the entire construction period. In all 149 cantilever panels and 56 Hiwassee panels were built. During the first season of construction more Hiwassee type were built and used than cantilever. This trial period indicated the advantages of the cantilever type and from then on all new panels were made cantilevered. Cost data show that alignment was more expensive in the Hiwassee type form, but that the cantilever form was more expensive to move. However, considering both moving and alignment the cost study showed the Hiwassee type to

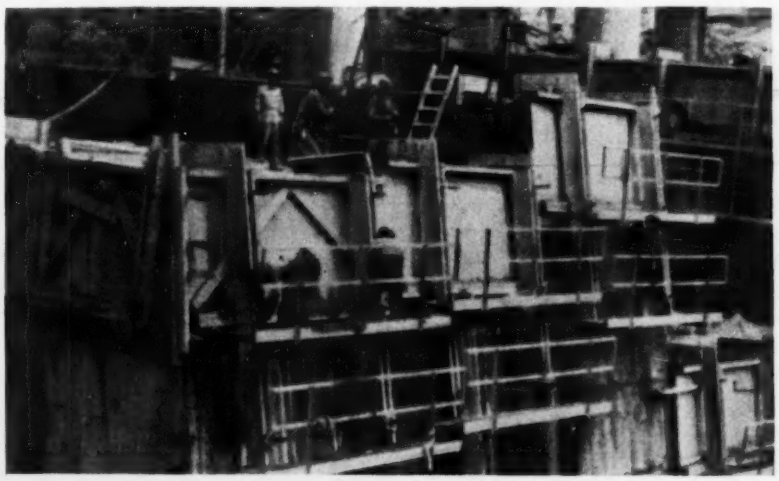


Fig. 3. Four-inch tongue and groove vertical sheathing was used for the cantilever forms as shown on the upstream face in various stages of lifting.

require 3.7 percent more man hr. per sq. ft. and cost 9.9 percent more per sq. ft. It is important to note that saving man hours in alignment is more advantageous than saving man hours in form moving as the former requires more carpenters at wages much higher than those of form movers.

Throughout the entire construction period greater top movement was noted in the Hiwassee form than in the cantilever form. Movement in the case of the Hiwassee type was due to the adjustable tie feature. This connection received considerable attention but the movement of the pipe templet type was always considerably greater than the deflection of the cantilevered form.

A further advantage of the cantilever type is in the embedded material saved. In the Hiwassee type form 76.2 lb. of steel in the form of pipe templets and hook rods were used per 16 ft. panel, whereas, 22.5 lb. of hook rods were used in each panel of the cantilever type.

The weight was greater and the material was more expensive for building the cantilever form than it was for the Hiwassee type. Some of the material cost and weight could be eliminated by development but it is doubtful if the weight of the cantilever panels could ever be cut to the weight of the Hiwassee type. Both types were lifted with the same portable "A" frames.

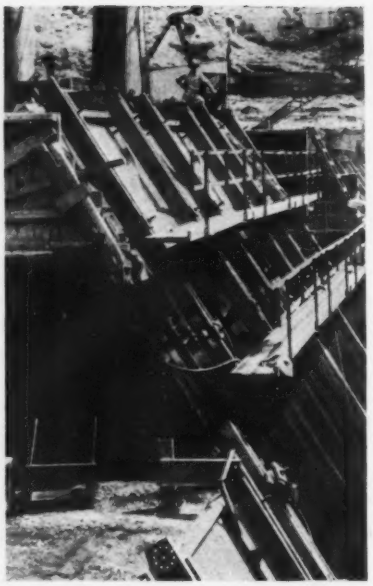


Fig. 4. Cantilever forms used on the downstream face of Mahoning Dam.

The advantages of each type form as observed at Mahoning Dam may be summarized as follows:

Advantages of Hiwassee type form.

1. Less weight
2. Less initial cost
3. Less cost for moving

Advantages of cantilever form.

1. Less carpenter work and cost for alignment
2. Less deflection in cantilever than top movement in the other type
3. About 70 percent saving on weight of embedded material
4. Safer because of the self-supporting arm

Mahoning Dam was built for flood control purposes on the Allegheny watershed above Pittsburgh. It is a concrete gravity structure extending to 160 ft. above stream bed and having a crest length of 993 ft. Estimated cost of the dam and appurtenances is more than $5,000,000. The structure was designed and its construction supervised by the U. S. Engineer Department, Pittsburgh district. The major construction has been completed by the Dravo Corp.

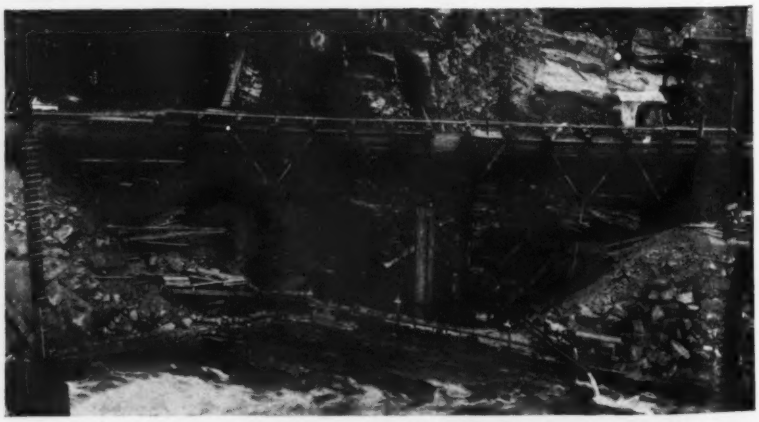
Temporary Support for Penstock To be Embedded in Concrete Dam

A DAM for developing additional power on the Lois River in British Columbia had to be built around a 10-ft. penstock in which it was desirable to minimize any service interruption. This was accomplished at minimum expense by the use of concrete columns or piers that were later embedded in the concrete of the dam itself.

The pair of columns was constructed in a 3-compartment shaft, 6x20 ft. in plan, lagged to prevent caving. This shaft was put down 65 ft. below stream bed to reach rock. In its two outer compartments were placed steel latticed columns 3 ft. square consisting of angles at the four corners and light lacing to make up a column frame. Forms were wired to this steel skeleton and were filled with concrete in lifts of about 20 ft.

The tops of columns thus constructed were capped with timber which served as the meeting place or central pier for two 64-ft. Howe trusses that carried the weight of the original wood stave penstock. Supported in this way, the penstock remained in service until the concreting of the dam had advanced far enough to provide adequate support for the 12½-ft. steel pipe that was built into the dam to carry the penstock flow permanently. With the steel replacement pipe all ready for substitution, it was only necessary to shut down the power plant for 8 days after which it was started up again with water flowing through a steel section 205 ft. long.

The dam was constructed for the Powell River Co. by the Stuart Cameron Co., Ltd., Vancouver, B. C.



Temporary support for 10-ft. wood stave penstock to be embedded in dam.

A City Buys a Distribution System

Carl F. Lambert
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***Contents in Brief**—This spring the water distribution system serving Miami, Fla., passed from private to public ownership. Thus was terminated an arrangement whereby the city was treating and supplying water at wholesale rates to a private company which distributed it. How the complexities of this situation were finally resolved constitutes an important chapter in waterworks administration.*

LAST APRIL WHEN THE CITY of Miami presented to the Florida Power & Light Co. a check for $5,929,945, the city not only purchased a water distribution system, but thereby completed the settlement of a controversy which began many years ago.

To fully appreciate the significance of this change in ownership, it is necessary to outline the complexities of the water situation in Miami. The supply and purification system has been owned and operated by the city since 1925. Water secured from wells, is filtered and softened in a 40 mgd purification plant. City-owned and operated pumping facilities convey the water ten miles from the plant to surface storage tanks of 15 million gallons capacity. At this point four pressure pumping stations pick up the water, three of which were owned by the private company. The fourth station, which pumps 90 percent of the water, is owned and operated by the city. Located adjacent to the city incinerator, the latter pumps are steam turbine-driven, operating on steam generated from the burning of municipal refuse. For this service the private company paid the city $7.50 per million gallons pumped.

The water distribution system, with certain exceptions, was owned and operated by the Miami Water Co., a subsidiary of the Florida Power & Light Co. At the time of the inventory, on which the purchase was based, and which was made as of August 1, 1938, this system consisted of the following: 1,345,000 ft. of galvanized iron pipe varying in size from ¾ to 6 in., of which 73 percent was 2 in. in diameter; and 817,570 ft. of cast iron mains, varying in size from 1¼ to 36 in., of which 77 percent was 4 to 12 in. in size.

The water company also owned a 1,000,000 gal. elevated tank, and two booster stations besides the pumping stations previously mentioned. Through this system water was supplied on a retail basis to all consumers in Miami, in the county adjacent, and to two small communities. This accounted for about 62 percent of the water pumped. Water was also sold on a wholesale basis to the cities of Miami Beach and Coral Gables, the former taking about 30 percent of the output and Coral Gables about 6 percent. The city sold water direct from the purification plant on a wholesale basis to the towns of Hialeah and Miami Springs; together these places take 2 percent of the water pumped.

Another district, known as Coconut Grove, was formerly a separate municipality and it had its own water system, including supply, pumping station, purification and distribution systems. This district became a part of Miami a few years ago and the city has since been operating the system as a separate entity.

To complete the picture, it should be noted that the city owns and operates a fully equipped high pressure fire system in the downtown area, including well supply, pumping stations and distribution facilities. In addition, the city has always owned all fire hydrants which were connected to the water company's distribution system, for which it was charged with hydrant rental.

The water company made all collections from individual consumers in the Miami area. To the regular bills, a 50 percent surcharge was added and this, less a 5 percent col-

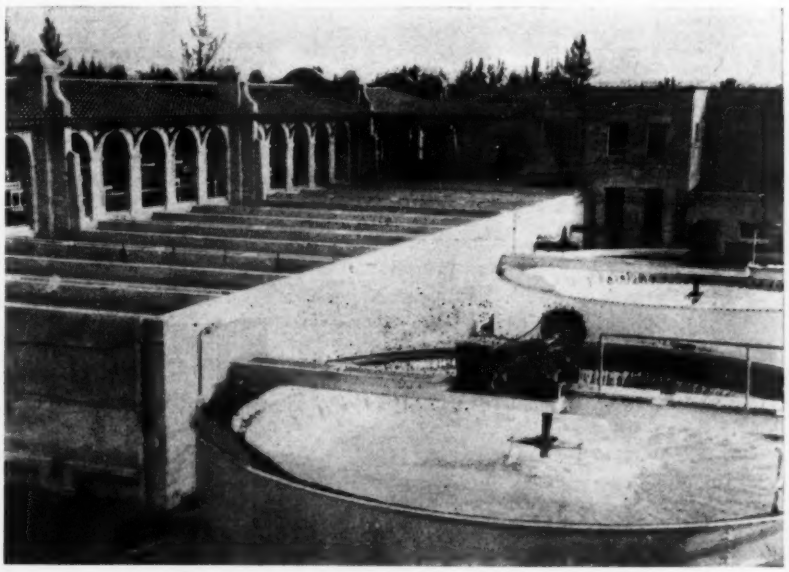

Fig. 1. Filtration and water softening facilities operated by the city of Miami.

lection charge, went to the city in payment for production and purification costs. The water company also made collections on a wholesale basis from Miami Beach and Coral Cables and on this wholesale charge, a surcharge of 75 percent was made and paid to the city.

For a number of years Miami tried to acquire the water distribution system, but the company indicated no desire to sell, and the city lacked legal sanction to condemn the property. Various controversies arose, one of which was the failure of the Florida Power & Light Co. as well as its subsidiary, the Miami Water Co., to pay personal taxes over a period of about seven years; this finally reached the sum of over $900,000. The city, in the meantime, had not paid its hydrant rental, street lighting bill, and some other obligations totaling over a million dollars. Another subsidiary of the Florida Power & Light Co.—the Miami Beach Electric Co.—operated a street railway system which originally belonged to the city, but many years ago had been turned over to the private company for operation with certain guarantees. From this operation there had developed a claim against the city of about $1,250,000.

Finally, in 1938, the private company indicated a willingness to sell the water system, provided all controversies could be settled. Subsequent conferences resulted in an agreement covering a compromise settlement of the tax and street lighting controversies, as well as some of the minor disputes. All of these were made contingent upon an agreement between the city and the company as to the fair value of the water distribution system, the value of the hydrant rentals, and a settlement of the street railway claim.

To effectuate the settlement, a board of three engineers was appointed. On this board the writer represented the city, Malcolm Pirnie, consulting engineer of New York, represented the company, and L. R. Howson, consulting engineer of Chicago, acted as the third member. After the board agreed on a reproduction value, as of August 1, 1938, of $4,734,413, exclusive of paving over mains, three questions remained for settlement: amount for depreciation, cost of paving, and going value.

Eventually a sale price of $4,500,000 was agreed upon for the property of the water company, the city also agreeing to pay the actual cost for any extensions and additions made subsequent to August 1, 1938. The hydrant rental matter was settled when the city agreed to pay $272,000. And the street railway claim was closed when the city agreed to pay the company $458,000 in settlement of the $1,250,000 amount as claimed.

A contract confirming these negotiations was entered into in December 1939. Although not required to do so, the city commission felt that it was desirable to have this agreement ratified by a vote of the people, and this was done in an election held on January 9, 1940.

Ratification of the agreement paved the way for the next step, which was for the city to determine how best to secure the $458,000 with which to pay the street railway claim. This had to be done before the water deal could be consummated.

In making the arrangements to finance this claim, a secondary objective was reached. The street cars in Miami served only a small portion of the city, the balance of the transportation needs being met by two separate bus systems. Since it was desired to get rid of the antiquated street cars and as the two bus systems were operating under temporary permits, plans were prepared for a unified bus system covering all city needs. Bids for the operation of this system were received on a 15-year franchise, one of the requirements of which was a payment of $458,000 over a 10-year period. The franchise was granted to the Miami Transit Company, and ratified on an election held in October 1940.

The next step was the preparation of the trust indenture and arrangements were completed for the sale of bonds as well as the transfer of certain bonds which were already a first lien on the water revenue of the city. This accomplished, about $8,000,000 of 30-year water revenue bonds were sold in March 1941, at an average interest rate of 2⅞ percent. This bond issue provided funds for immediate needs and for necessary extensions.

The city then set up a separate department of water and sewers, and all employees of the private water company, except executives, were taken over and given civil service ratings. By legislative enactment, it is proposed to place this department under a water board, independent of the city commission.

It is anticipated that the new department will be able to pay about $200,000 annually into the general fund of the city, besides paying taxes. The city will pay the department $30 per year per hydrant rental, and the water department will pay the city $50,000 per year in lieu of taxes.

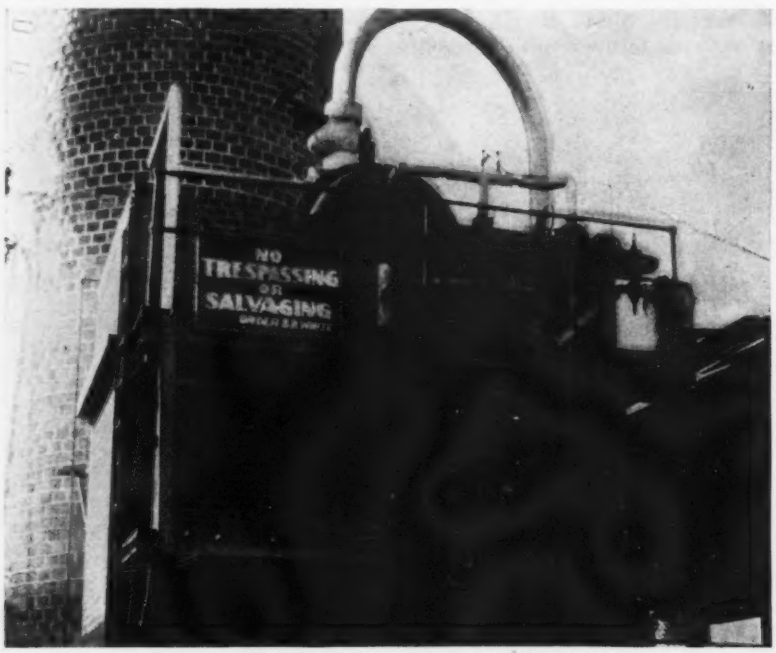

Fig. 2. Steam produced by the burning of refuse at the municipal incinerator furnishes power to pump over 90 percent of the water.

How Priorities Work in Construction

Robert B. Colborn
Washington Correspondent, Engineering News-Record

***Contents in Brief**—Since June, when the priorities problem was first analyzed in these pages, developments have been varied and frequent. Project ratings have come into the picture. Repair and maintenance requirements are now given an automatic priority. Special procedures have been applied to private defense housing and highways. And most recently, allocation, which is concerned with direct governmental control of the raw material in contrast to priorities which indirectly control the finished product, has become important. "How can I get the material?" is the No. 1 question of construction. Here's how:*

A Few Weeks Ago a Group of oil companies decided to build a pipeline from Texas to New Jersey, at a cost of about $70,000,000. They made arrangements to get money. Congress passed a special law to help them condemn rights-of-way. Everyone agreed on the need for additional oil transport to the East Coast. No major technical problems stood in the way. It was a gilt-edged project.

Today, however, no pipeline is under construction. The plan has been deferred, probably abandoned. And for just one reason. Seven men —the Supply, Priorities and Allocation Board—had decided that steel plate could not be spared from shipbuilding to fabricate the pipe.

Week by week, the handling of priority problems is becoming a larger part of the construction man's job. Questions like "Can we get the material?" or "Can we get a rating?" are assuming the same importance in planning projects as "Can we get the money?". The simple fact is that as a result of the demands of munitions manufacturer there just aren't enough materials or machines in this country to make all the things that people want. Clearly, the stuff that's available has to be divided up and put where it will do the most good. The "priorities system" is the mechanism by which this is being attempted.

Under laws passed since the defense program started, the President can give orders to any firm as to what jobs it shall do first and what deliveries it shall make first. This power is exercised by the Priorities Division of the Office of Production Management under the general supervision of the new Supply, Priorities and Allocation Board. Donald Nelson is administrator of the Priorities Division and executive secretary of SPAB.

The priorities system has a vast number of things to do—all the way from indicating which wool blankets shall be manufactured first to distributing monthly production of aluminum. Inevitably, therefore, a multitude of varying forms and procedures have developed. And they are constantly changing. Anyone using priorities has got to keep in constant touch with what is going on in his field. But fortunately nearly all priority actions are variations of a few broad types, and an understanding of these will simplify the problem.

What is a priority rating?

The simplest—and originally the only—form of priority document is a preference rating attached to an order for goods or services. This is a piece of paper, signed by the director of priorities, compelling the firm which receives the order to accept it and to make delivery by the scheduled completion date — even though the firm has to delay other orders. Preference ratings are of varying degrees of urgency, as indicated by a numerical designation ranging from A-1, the highest, to A-10. Because of the tendency to give too many orders an A-1 rating, this has had to be subdivided, A-1-a, A-1-b, . . . A-1-j. In the past, B ratings have occasionally been used to indicate the relative importance of different non-defense orders, but at present these don't mean very much.

A manufacturer of, say, power shovels who has a number of orders with different ratings is supposed to make deliveries on all of them on the delivery date specified in the order. If he can't do this, he delays delivery on the lower rated orders and makes the high rated deliveries on schedule.

Purchase orders placed by the Army or Navy for scarce items automatically carry a preference rating. The Priorities Division has turned over to the Army and Navy Munitions Board a lot of blank priority forms, already signed by the Director of Priorities. When an Army or Navy purchasing officer buys something, he simply fills out one of the forms and attaches it to the order.

Of course the Army and Navy isn't allowed to do this every time they buy a dozen pencils, or the country would be flooded with priority ratings. Purchasing officers may use priority ratings only when they buy something scarce. A list of some three hundred scarce items has been compiled, called the Priorities Critical List. This list is revised monthly.

Obviously, too, it can't be left up to the individual purchasing officer to decide what rating shall be attached to the things he buys, or every order would be A-1-a. Therefore, the Army and Navy Munitions Board has drawn up a set of directions, called the Priorities Directive, telling what rating shall be given to different types of orders. Thus, for instance, the directive will say that goods to be used to modernize existing airports rate A-1-b, goods to be used for troop housing rate A-1-j, etc.

Construction supplies

This same system applies also to orders placed by construction contractors doing work for the Army or Navy. A priority rating can be at-

tached to the order by the military representative on the job.

Suppose, for instance, a cantonment contractor wants to buy a bulldozer for delivery Nov. 15. The constructing quartermaster on the job looks at his Priorities Critical List and sees that bulldozers are included on it. He looks at the Priorities Directive and sees that a rating of A-1-j is in order. He therefore fills out a preference rating form with this rating and attaches it to the order for the bulldozer.

The bulldozer manufacturer might already have in his shop an order rated A-3, calling for delivery Nov. 1. If possible, he will make delivery on both orders on the scheduled date. It may be, however, that he is so crowded with work that he can't fill both orders on time. In that case he would delay the A-3 order, perhaps until Nov. 10, perhaps even until Dec. 1, in order to deliver the cantonment contractor's bulldozer on Nov. 15.

Extension of ratings

In order to build the bulldozer, the manufacturer has to buy an engine, and it may be difficult to get one soon enough to fill the cantonment contractor's order on schedule. He needs a priority rating on his order for the engine. To get it, he "extends" the rating attached to the bulldozer order. That is, he fills out and signs a statement that he needs delivery of the engine on, say, November 11, in order to fill a Nov. 15 order for a bulldozer bearing a rating of A-1-j and that he is therefore attaching an A-1-j rating to the engine order. This statement must be countersigned by an Army or Navy official—perhaps the inspector in the bulldozer plant, if there is one, or perhaps the constructing quartermaster on the cantonment job.

In the same way, the engine manufacturer can extend the rating to an order for carburetors to go into the engine, and so on down the line.

Ratings can only be extended in this manner to items on the critical list.

Civilian defense orders

Many orders of defense importance are not placed by the Army or Navy. The bulldozer for instance might be needed in the construction of a shipyard for merchant ships or to build a privately owned machine-gun factory. In this case the buyer must apply directly to the Priorities Division in Washington for a rating. A special form is available for this purpose. The application may be addressed simply to the Director of Priorities or it may be directed to the branch of OPM having jurisdiction over the particular problem involved. The organization of the Priorities Division will be discussed later.

With one important exception, ratings obtained in this manner can be used in the same way as those coming from the Army and Navy. Exception is that these ratings cannot be extended. If the bulldozer manufacturer wants a rating on his engine order, he must make out a new application to the Priorities Division. The application, of course, would draw attention to the fact that the engine is needed to fill a priority order for a bulldozer, and issuance of the rating would be pretty certain.

Application must also be made to the Priorities Division when it is desired to attach a rating to an Army or Navy order for an item not on the Critical List or to depart in any other way from the established procedure.

A considerable number of forms have been developed for handling this system, and there are several with which everyone should be familiar. These are known as PD (standing for Priorities Division) forms, and priority ratings attached to individual orders are frequently referred to as PD ratings. Form PD-1 is the form used in making application for a rating to the Priorities Division. Ratings are issued by the division on a PD-2 form. Ratings issued by the Army or Navy are put on a PD-3 form.

Project and blanket ratings

This system of PD ratings evolved last year under conditions in which scarcity was the exception rather than the rule and when it was desired to hold priority control to a minimum. As recently as last May, most priorities still fitted into this scheme. But now it is chiefly used as a trouble-shooting device, and priority control is mainly exercised through other means.

As the country moved farther into a war economy, more and more things became scarce, and at certain points the burden of attaching individual ratings to every order needing one became overwhelming. Thus a machine tool manufacturer would find that every order in his shop bore a rating, and that his own orders for steel or motors would be enmeshed in a chaos of different ratings. Similarly, a construction contractor would have to attach ratings to nearly everything he bought.

To meet this problem, the device of the "project" or "blanket" rating was developed. This is a document which consolidates into one all the ratings to which a particular project or manufacturer is entitled.

Project ratings are of a good many types, each type being designated by the letter P and a number. The type used for construction is the P-19 order. Each order issued bears a serial number and authorizes the recipient to apply a particular rating —A-1, A-3, or whatever—to certain of his purchases. Under a P-19 order, the rating may be applied to all purchases of items on the critical list. Some other P orders contain a list of particular materials to which the rating may be applied.

To use a P-19 order, the contractor sends to each of his suppliers a signed copy or photostat of the order. Then to each subsequent purchase order he attaches a memorandum saying that under Priority Order P-19, serial number so and so, the purchase order is entitled to a preference rating of such and such. The supplier may use the same procedure to apply the rating to his suppliers.

P-19 orders are issued by the Army and Navy Munitions Board to construction contractors holding contracts from the services. Special arrangements, to be discussed later, have been worked out to facilitate the issuance of P-19 orders in connection with house construction—public and private—and road-building. Similar plans are in preparation for municipal and state construction.

In all other cases project ratings are issued directly by the Priority Division of OPM. No special application form is used. A detailed letter should be sent to the director of priorities, describing the project with some fullness, explaining its defense importance, stating on what materials procurement difficulties have been experienced and what efforts have been made to obtain them, and

giving the names and addresses of suppliers used.

Holders of project rating orders will ordinarily not have to make much use thereafter of individual PD ratings, but they are still available as a troubleshooting device. Thus it might be found that a rating was needed to buy some item not on the critical list, or again the rating given in the P-19 order might not be high enough to get prompt deliveries on some particular item. In such cases application can be made to Priorities Division on a PD-1 form for an individual rating on that particular order.

Repair and maintenance

Somewhat similar to project ratings are the repair and maintenance ratings. Inescapably, war is restricting the supply of civilian goods and equipment. But it is realized that if the country is to keep running, existing equipment and facilities must be maintained in good repair. Therefore priority aid is being given in meeting repair and maintenance needs. This is the simplest to use of any type of priority.

Under this plan, a list of important services and industries is established, and organizations included on the list may attach an A-10 rating to their orders for maintenance supplies. The list includes: all public highway maintenance; all common, contract, and private carriers of passengers and freight; manufacturers of highway maintenance equipment; shipyards and ship repair yards.

An eligible organization need make no application for the use of this rating. In placing orders for maintenance and repair needs, it simply attaches to the order the following statement: "Purchase order for repair or emergency inventory—Preference rating A-10 under Preference Rating Order P-22."

Under a variation of this plan, public utilities—electricity, gas, water, steam, or sanitary services—may use an A-10 rating not only for repair and maintenance purchases but also for operating supplies. The same procedure is used except that reference is made to Preference Rating Order P-46. Also, utilities must file with OPM a statement promising to hold inventories to a minimum and not to apply the rating on purchases of greater quantities than they used last year. In case of breakdowns resulting in stoppage of service, utilities may make telegraphic application to the Priorities Division for an A-1-a rating on emergency repair parts.

Allocation of materials

Common to all the types of priority control so far discussed is the fact that they start with the finished product. What the government does, essentially, when it hands out individual or project priority ratings, is to indicate relative degrees of urgency of various goods and services. It tells industry what things it particularly wants done and then leaves it to the more or less automatic workings of private management to effect the necessary scheduling through all the stages of producing, fabricating, and assembling raw materials.

Since last March, an entirely different kind of priority control has been developing alongside the system of ratings. This plan, generally known as allocation, starts at the other end with the raw material. The government tells the producers of, say, aluminum that so many pounds shall go this month to that airplane producer, so many to that foundry, so many to that ship-builder. Next month, the government will furnish a new schedule. When these schedules conflict with priority ratings, the schedules govern.

Priority by allocation represents a much greater degree of government control over industry than does priority by preference rating. With allocation, the government assumes an active voice in the detailed operating decisions of management—becomes, as it were, the production superintendent in every plant. With war enforcing tighter and tighter government regulation of industry, allocation is occupying an increasingly important place in priority control.

Priority Director Donald Nelson says that allocation will soon become the most common form of control. He suggests that it may be applied from the finished product end as well as the raw material end. This would mean that instead of a priority rating, defense and essential civilian industries would be given a certain poundage of material. Something of this sort has already been done in the defense housing priority plan. Here, OPM decided to let house-builders have enough material to build 200,000 houses. The ratings being given to builders merely evidence their right to participate in this pool.

At present, all metals except the precious ones are under allocation, as are rubber, cork, silk, manila fiber, and a long list of chemicals. And the number of materials covered lengthens every day.

Construction men, to date, have not been much effected by allocation procedures. In general, these procedures govern the relations between metal producers and metal fabricators, while construction is a consumer of fabricated metal. However, the growing importance of allocation is such that every one dealing with priorities should understand it.

Materials are brought under allocation by so-called M (for Material) orders, each dealing with a particular material. Thus M-1 governs the distribution of aluminum, M-9 that of copper, M-21 that of steel. The orders differ widely in detail, but each asserts the intention of the government to control the material, each directs producers of the material to accept and fill all defense orders.

Typical and of special importance are M-17 and M-21, the iron and steel control. This starts with producers of pig iron, and the Priorities Division takes on itself the burden of deciding how much of the available supply shall go to foundries for casting and how much to the mills for manufacture of steel. Pig iron producers are required to set aside a percentage (determined each month by OPM) of output in a pool to be shipped in accordance with instructions from the division. Moreover, each month they must submit to the division their proposed schedule of shipments. No iron may be shipped until the division has made such changes as it wishes and approved the schedule.

Control over steel itself is considerably less strict. Steel producers are required to accept and fill all defense orders and are allowed to fill nondefense orders after defense demands have been met. Specific OPM approval of delivery schedules is not required, but OPM asserts its right to direct steel producers from time to time to make specific deliveries and to direct steel buyers to place their orders with specific producers.

All steel buyers must fill out and turn over to the producer a form (PD-73) telling what the steel bought is to be used for. Every month the steel producer must consolidate these reports into a report to OPM on the use being made of his steel.

Steel warehousers may only buy steel up to a quota set by OPM—currently equal to the rate of purchases during the first quarter of 1941. They may use an A-9 rating in buying up to this quota. After setting aside enough carbon steel for present and anticipated defense orders, warehouses may make deliveries to non-defense consumers. However, except in very small lots, they may not deliver alloy steel to non-defense users.

Special construction procedures

The variety and number of construction projects entitled to P-19 ratings is so great that several special procedures have been developed for different classes of construction—publicly-financed housing, private housing, and roadbuilding. On publicly-financed housing, the Federal Works Agency has been authorized to give its contractors project ratings in much the same way that the Army and Navy Munitions Board does to military contractors.

Project ratings are to be granted to builders of 200,000 privately-financed houses. Ratings will only be given to houses in designated defense areas, costing less than $6,000 or renting for less than $50, and in the occupancy of which preference will be given to defense workers. The rating can only be used in purchasing building materials included on a special Defense Housing Critical List.

A builder who is eligible for a rating makes application to the nearest local FHA office. There his application is checked for correctness and forwarded to an OPM field office, where it is reviewed jointly by a representative of the Priorities Division and one from the Coordinator of Defense Housing. If the application is approved, a rating is issued in the field office.

Road priorities

All roads with federal money in them are entitled to priority aid under another special scheme which is administered by the Public Roads Administration. High ratings are assigned to construction of access roads into military reservations or munitions plants, and progressively lower ratings to construction of roads on the strategic network, both primary and secondary. Procedure is for each state highway department to draw up a list of its projects that are eligible for ratings and turn the list over to the local PRA office. After examination, the list is referred to PRA in Washington and, if that agency approves, a rating is issued. Municipalities and counties are not specifically included in the plan, but they may call upon PRA for priority assistance.

A scheme to aid municipalities and state governments to get ratings for their construction work other than roadbuilding is being studied but is not yet worked out. To date, the only procedure is to follow the regular course of sending a letter of application to the Project Rating Section, Priorities Division, OPM.

Limitation orders

One other form of priority control, which is still narrow in its application but is likely to increase in importance, is the Limitation or L order. An L order is applied to a non-defense industry and establishes a maximum output which it will be permitted to produce. It sometimes grants a priority rating to aid in getting materials for production up to the quota. To date, four L orders have been issued, all dealing with the automobile industry.

Governmental organization

The governmental structure by which priorities are administered has gone through a number of drastic revisions in the past year and will probably go through more. At the moment of writing, it is as follows:

Setting general policies is the new Supply, Priorities, and Allocation Board. This deals with broad questions such as the extent to which civilian needs shall be protected, whether to bring a particular material under priority control, and the like. It is composed of the seven heads of the major defense agencies.

Under SPAB is the Office of Production Management, headed by Knudsen and Hillman. OPM is divided up in two ways. At the top it is split into divisions—priorities, production, civilian allocation, materials, labor, and contract distribution. Each of these divisions maintains a more or less skeleton staff to deal with the general aspects of its subject. Thus Priorities Division, as such, is responsible for the formal issuance of ratings and the development of procedures. It has various sections, also, such as the Project Rating Section under Ward Freeman and the Maintenance and Repair Section under Jerry Low.

Cutting across this breakdown into divisions, OPM is split up into "Industry Branches." Each branch handles the problems of a particular industry, product or material. For instance, there is a steel branch, an aircraft branch, a construction branch, and about twenty-five others. Each is supposed to deal with all the problems—including priorities—of its particular field. On the staff of each branch is a specialist from each of the OPM divisions. These branches handle most of the detailed work in connection with the administration of priorities. So far, however, the construction branch, headed by A. V. Kahler, has not concerned itself much with priority problems, and most priority aid to construction has been handled either by the Project Rating Section or by the industrial branches—steel, copper, or the like.

Fortunately, the man who needs a priority rating need not concern himself overmuch with the internal mechanics. It is usually sufficient that he address applications and correspondence to the Director of Priorities, New Social Security Building, Washington, D. C.

Zoning Administrator Post Unique in City Planning

In establishing an office of zoning administrator under a recently revised city planning setup, Los Angeles took a step unique in municipal zoning and planning, the American Society of Planning Officials reports. Established under a city charter amendment creating a department of city planning, the new zoning administrator will relieve the city planning commission of the task of dealing with zoning problems brought about by the large building program under way in the Los Angeles area, a task which has been taking most of the commission's time.

Under the new procedure petitions for zoning variances—use of property for a purpose not permitted in a particular area under zoning law—will be filed with the zoning administrator, who is authorized to issue the variance if he makes a finding that certain exceptional conditions prevail. Any appeal from the zoning administrator's action will be heard by a zoning board of appeals, which acts in a semi-judiciary capacity.

Why Some Applicants Were Rejected

D. B. Steinman
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***Contents in Brief**—The author, for many years a member of board that examines applicants for a license to practice engineering in New York State, cites numerous examples of the type of applicant's answers that, by their absurdity, indicate that not all who profess to be engineers are entitled to that distinction. Some of the answers serve to give spice to the work of the engineering examiners.*

"BELIEVE IT OR NOT," the responses quoted below are actual cases from the records of interviews given by the New York State Board of Engineering Examiners to applicants for registration as professional engineers.

These oral interviews are given in all doubtful cases before assignment to the written examinations, or when the candidate claims exemption from written examinations on the ground of long-established professional standing and practice; also whenever an applicant requests a review of his case following prior rejection. The rule is to give the applicant every opportunity to present his case and to show his qualifications. Since the written examinations are the final test, admission to them is withheld until the candidate proves himself otherwise qualified, by character, education, and experience. The oral interview is a preliminary screening to separate the possibly qualified from the obviously unqualified. After the candidate's review of his education and experience, the simplest and most elementary questions are put to him to test his claimed experience and to ascertain whether the applicant thinks and speaks in the language of engineering.

The questions asked in these interviews are what might be termed "ignorance-detectors." To any real engineer, they are absurdly elementary. To the unqualified men who think they are engineers or who are brazenly holding themselves out as engineers, also to those engineering graduates whose minds have become a blank after graduation, these simple oral questions prove to be an impassable hurdle. When this occurs, the applicant's prior record of experience cannot be accepted as "engineering experience," at least it cannot be accepted as meeting the board's published definition of satisfactory engineering experience, no matter how many "calendar years" of employment may be shown. It would be a waste of time, besides being a violation of the provisions and intent of the law, to admit such applicants to the final test—the written examinations.

In the oral interviews, examiners are frequently amazed by the display of illiteracy, ignorance, or dumbness of the prospective candidates for engineering registration. These are the men who could continue to hold themselves out as engineers—to their employers, their clients, and the public—were it not for the registration law and its enforcement. It is a painful, but wholesome, shock to these men when the board has to tell them, firmly and impersonally, that they are not engineers and that they must discontinue holding themselves out as engineers. Considering the elementary nature of the questions asked, the ignorance and confused thinking revealed by the answers are almost incredible. Some of the prize responses have been recorded verbatim and are reproduced here to indicate why these particular candidates were rejected, also as an illuminating answer to the larger question: "Why Register Engineers?"

Case 1—This candidate, with limited evidence of education, presented an application listing many years of impressive professional engagements on "the design of mechanical equipment for vessels of the U. S. Navy." At the oral interview, he was asked the most elementary questions.

Question: What is a horsepower?
Answer: 33,000 lb.

Question: Do you mean that a horsepower is the same thing as 16½ tons?
Answer: No, sir. It is twice as much.

Question: Wait a minute. 16½ tons equal 33,000 lb., and you stated that a horsepower is equal to 33,000 lb. Then what is the relation between a horsepower and 16½ tons?
Answer: They are the same thing.

Case 2—This candidate claimed extensive experience in structural design.

Question: What do you mean by the bending moment in a beam?
Answer: It is the *moment* when the beam bends.
(The examiner was not sure he had heard correctly.)

Question: Do you mean the *instant* when the beam begins to bend?
Answer: Yes, sir—the instant when the beam begins to bend.

Case 3—This candidate claimed extensive experience in the design of heating and power equipment. When an elementary question on heat calculations seemed to cause confusion, the examiner tried to simplify matters.

Question: One pound of water, when vaporized, will yield how many pounds of steam?

Answer: I am sorry, sir, but I really have no idea.

Case 4—This candidate, after engineering graduation, had worked four or more years in one of the largest electric power plants.

Question: Why is some of the equipment in your plant rated in kilowatts and some in kva.?

Answer: I do not know.

Question: What is a kilowatt?

Answer: A thousand watts.

Question: And what is a watt?

Answer: I do not know.

Case 5—This candidate was a construction superintendent who claimed life-long experience in the design and execution of difficult shoring and underpinning operations.

Question: What is the safe load on a 12-by-12 timber post?

Answer: I do not know.

Question: How strong is the timber you use?

Answer: I do not remember.

Question: Is it about 200, 2,000, or 20,000 lb. per sq. in.?

Answer: I do not remember.

Question: Suppose I tell you it is about 2,000 lb. per sq. in., then how would you calculate the strength of a 12 by 12-in. post?

Answer: I would multiply by 12.

Case 6—This candidate claimed to be a "heating and ventilating engineer."

Question: How much heat does it take to make a pound of steam?

Answer: 33,000 B.t.u. per pound of pressure per minute of heat transfer.

Case 7—This candidate claimed to be an expert on structural design in steel and in reinforced concrete.

Question: When you say that the modulus of elasticity of steel is thirty million pounds per square inch, what does that mean?

Answer: It is the load at which the steel begins to stretch.

Case 8—This candidate claimed many years of experience in designing and constructing piers and wharves for the City Department of Docks.

Question: Do you use creosoted piles?

Answer: We used to, but now we have no more *linoleum* and *torpedoes* in the river.

Question: You mean the *teredos* and the *limnoria?*

Answer: Maybe that's the French name for them.

Case 9—This candidate claimed extensive education through home study and private tutoring.

Question: How far did you get in your study of mathematics?

Answer: Through calculus.

Question: What is the tangent of 45 deg.?

Answer: It is a line drawn on a circle.

Question: What is the sine of an angle of 30 deg.?

Answer: I do not know.

Question: What do you mean by the sine of an angle?

Answer: It means whether it is plus or minus.

Case 10—This candidate, without engineering education, styled himself an "amusement engineer" and claimed to be the leading expert on the design of roller coasters. He has "designed" the huge roller coasters at some of the principal amusement resorts and for large fairs and expositions.

Question: How do you calculate the stresses in the structure?

Answer: I know, from experience, how large to make all the pieces.

Question: What calculations do you make?

Answer: I have a formula in my office for the force on a car going over a curve.

Question: Do you employ any other formulas?

Answer: No, sir. That is the only one I need.

Question: What factor of safety do you use?

Answer: About 90 percent.

Question: Do you mean that your factor of safety is less than unity?

Answer: Yes, sir. Less than unity.

Question: Why do you do that?

Answer: To give the customers a bigger thrill. They have to hold on when they go over a curve.

Question: Isn't that rather dangerous?

Answer: No. When a car is going fast, you don't need a hundred percent safety. You get across before anything happens.

Question: Why do you not employ an engineer to do the designing for you?

Answer: I get only $10,000 for a design and, if I employed an engineer, I would have to give half of it to him.

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New York State Completes 20 Years of Registration

The registration law for engineers in New York State has been in effect 20 years, according to the annual report of the State Board of Examiners for Professional Engineers and Land Surveyors for the year ending June 30, 1941. In that period the board considered 42,000 applications, of which 24,000 were new applications and 18,000 were reconsidered cases. The number of licensed engineers registered in New York State now totals 14,742.

The board did not begin giving written examinations until 1931. Previous to that time 17,000 applications for license as professional engineer or land surveyor were reviewed by the board, including many reconsidered applications, and about 90 percent were approved ultimately. In the seven-year period from 1931 to 1937, when substantially the same type of written examination was in effect, about 8,000 certificates were granted, 5,000 on experience alone and 3,000 as a result of passing written examinations. Since 1938, when a more comprehensive type of examination was introduced, about 5,000 applications have been considered and about 1,500 certificates have been granted, of which nearly 1,000 were issued as a result of passing written examinations.

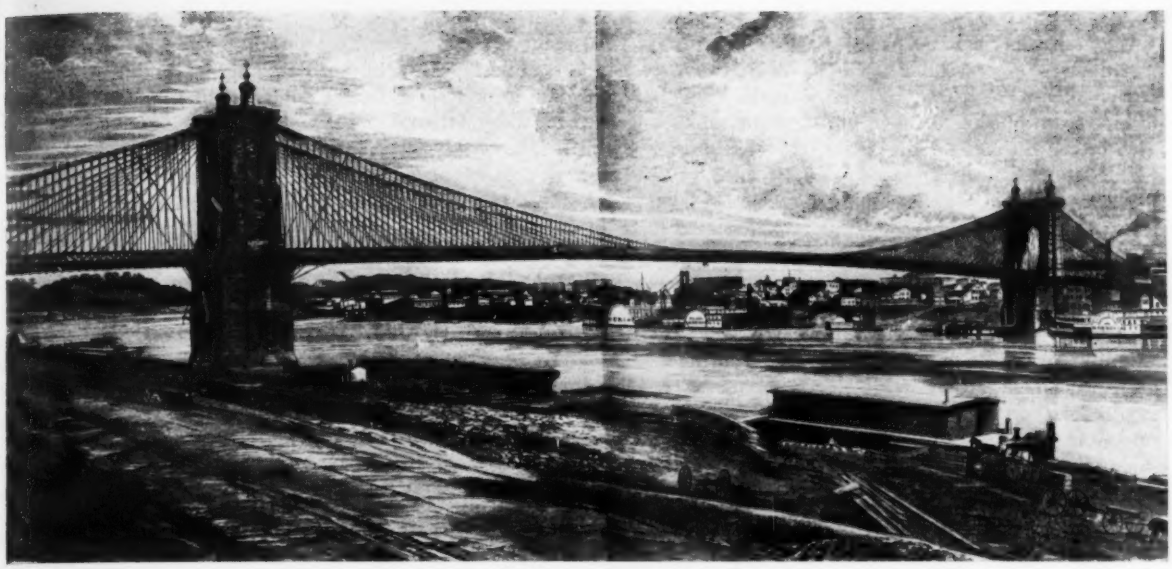


Fig. 1. Roebling's 1,057-ft.-span Cincinnati Bridge includes a system of stays anticipating present-day use of check stays.

Suspension Bridges and Wind Resistance

An article by the staff of

Modjeski and Masters

Consulting Engineers, Harrisburg, Pa.

***Contents in Brief**—Looking toward a solution of the problem of aerodynamic stability in suspension bridges, John A. Roebling's Cincinnati bridge, built in 1867 and still in service, is cited and his reports thereon are quoted to emphasize his understanding of the usefulness of bracing, stay systems, weight and proper stiffening members. For modern bridges, two remedial measures appear to hold most promise—decrease in pressure areas or provision of additional bracing. Venting floors and curbs and snubbed check stays are suggested. A proposed design using a triangulated suspender rope system that seems to offer damping characteristics of a high order is also outlined.*

THE BRIDGE engineering profession is under an obligation at this time to answer clearly and remove the question that has been raised by recent occurrences relative to the safety of long span suspension bridges. The early as well as recent wind failures of suspension bridges bear some points of similarity, but such similarity cannot be attributed to any one feature of design, such as the evolution of stiffening trusses, increase in span, decrease in sag or change in weight of unit of area of floor, as some have maintained. Nor need surprise be expressed at the fact that maximum floor motion occurred at the quarterpoints of the main span in every case, giving an undulatory effect to the whole of the spans, or that the undulations of the cables were in some cases in exact phase while in others they were out of step in varying amounts up to 100 percent. The tendency toward such movement is inherent in all cable suspension systems and must be counteracted in design by: (1) providing bracing, (2) increasing weight, (3) increasing strength of stiffening trusses, or (4) decreasing aerodynamic forces by reducing pressure areas or by changing the shape or type of the structure.

Many suggestions useful to the modern design of suspension bridges can be gleaned from the early writings of John A. Roebling, who understood the importance of bracing, weight and trussing in stiffening, and was the father of really stable suspension bridges. We of the firm of Modjeski and Masters came in close touch with his writings, thought and work some years ago when we were called upon by the Covington & Cincinnati Suspension Bridge Co. to make an examination of its structure over the Ohio River and to make an analysis of its strength with relation to present-day loadings.

This Cincinnati Bridge was completed by Roebling in 1867, just prior to the commencement of work on the Brooklyn Bridge. He prepared a quite complete report on the work, detailing procedure in construction and setting forth his original thought relative to proper design of suspension bridges and his ideas regarding the failure of earlier bridges, departing radically in several respects from

the then current thought and practice. His structures were stable, while numerous others had been or were being blown down, some of them failing two or more times in succession. With full knowledge of the weakness of other bridges, but with a remarkable record in the design and construction of stable aqueduct suspension structures, some rather small highway bridges in Pennsylvania, and the important combination railroad and highway bridge at Niagara, he came to Cincinnati to build the greatest suspension span in the world. The materials at his disposal included masonry, timber, iron and wrought iron, and iron wire, in which he placed great confidence. Steel was known to have superior qualities, very desirable for bridge construction, but as he states in his report of 1867, "It is not yet sufficiently perfected to insure entire uniformity such as can be had in iron wire. The time will come when the same uniformity will be obtained."

Roebling was certain that he could build stable suspension bridges, and that his deviations from conventional design were of great importance in securing such stability. This is explained in his statements, which are quoted as follows:

> The object of these remarks is to explain the difference between the French system and mine. The principal feature of the French plan is to suspend the floor to a number of small cables. By my plan only two large cables are suspended, one on each side. The Cincinnati Bridge is supported by two large cables, 12⅜ in. diameter. The cables in my bridges are always assisted by stays, and this feature is entirely wanting in the French system. . . . In the divided system one cable may break after the other, because they cannot be expected to act in perfect unison. The correctness of this view was fully demonstrated by the catastrophe which overtook the Wheeling Bridge on the 17th of May, 1854. . . . The floor was torn by the gale into three sections. . . . All the cables but two broke loose from the anchorage, *one after another.* . . . For want of stays and of stiffness the floor was subjected to very considerable oscillations, and thus broken up and destroyed *by its own momentum.*

> . . . I do not expect professional men to credit the statement, without seeing with their own eyes, that the center of the Ohio Bridge (Cincinnati) is not deflected by heavy gales, neither horizontally or vertically. This remarkable horizontal stability is in great measure due to the powerful bracing of the cables.

It will be observed from these quotations that Roebling added to the stiffness of his structures, over that which had been secured by others, by two means: (1) gathering all main cable strands into a pair of main cables, one on each side of the bridge and (2) by his system of stays.

Since his time we have accepted, as standard, the use of heavy main cables, but have diverged from his practice in the use of stay systems. This divergency occurred along with the great increase in weight of our modern bridges, coinciding with the adoption of heavier stiffening trusses and use of heavier floors. In recent years these weights have been decreased by simplification of stiffening member details and lighter flooring, and we may find it necessary to return to the use of some of the stays that Roebling found so effective. In fact there has been some tendency in that direction, as is indicated by the corrective measures recently employed on a few present-day structures where some degree of aerodynamic instability had been in evidence.

The main system of stays always employed by Roebling consisted of wire ropes, (2¼ in. in diameter on the Cincinnati Bridge), passing over the tower tops, descending on each side of the towers in straight lines to different points on the floor or stiffening truss, crossing the suspenders diagonally and connected to them by wire wrappings which held them firmly in position. Roebling states:

> Thus a network is formed that occupies the same inclined plane, which coincide with that of the cables. . . . The office of these stays is two-fold. They not only assist the cables powerfully in the support of the bridge but they also supply the most economical and most efficient means for stiffening the floor. Every stay constitutes the hypothenuse of a rectangular triangle, whose short sides are formed by the tower and by the floor. . . . This looks like a very simple proposition indeed, and is readily comprehended by sailors, who are accustomed to stays on board ships. . . . I have always insisted that a suspension bridge built without stays is planned without any regard to stiffness, and consequently is defective in a most important point.

With direct reference to the Cincinnati Bridge, Roebling states:

> To further guard against injurious oscillations which might be produced by the blow of a hurricane, eight heavy counter or check stays are anchored to the towers below the level of the lower cornice (just below the level of the roadway), and run up to the cables. Their sole office is to counteract any undulations which might be imparted to the cables by a severe blow. In ordinary conditions their services are not required.

This last quotation is remarkable in that Roebling, in 1867, described a bridge appliance that he had designed and actually placed in use, very similar to appliances put forward recently as new measures for securing stiffness. Roebling's check stays are still in place on the Cincinnati Bridge, and would seem to be proof of his anticipation of our present problem by about seventy-five years.

The natural increase in weight of structures that started with Roebling's record-breaking bridges was followed by further increases through the substitution of steel for timber in load-carrying members, increase in weight and strength of stiffening trusses (which Roebling employed on both the Brooklyn and Niagara bridges) and the use of concrete slab floors. All this was accompanied by demands for greater load-carrying capacities.

The greatest improvements in design, which led to our modern concept, were developed under Modjeski for the Delaware River Bridge at Philadelphia. The plans for this structure were laid using newly developed formulas, eliminating almost entirely the approximations of earlier theory. Full use was made of laboratory tests in the development of new knowledge, and the structure, as built, became the starting post in the design of our more recent projects.

It was not necessary for Roebling or for his successors, until we came to the present day, to give serious thought to *decreasing aerodynamic forces by reducing pressure areas or change in shape,* in order to secure stability. This is indicated by the fact that the static design of suspension bridges had progressively employed the first three remedial measures without recurrence of the instability of pre-Roebling structures, until the very recent Deer Isle, Golden Gate, Thousand Islands, Bronx-Whitestone and Tacoma Narrows bridges were built. Engineers simply designed their structures making the best use of improving materials, and meeting the requirements of modern loadings.

When the undulations of these latter structures were observed bridge engineers began to study and are still studying the full repertoire of possible corrective measures, giving new consideration to each in order to secure absolute safety for future long span bridges. All such studies are being made with the view of trying

Fig. 2. Suggested design for a modern long span bridge using a system of triangulated suspenders in conjunction with shallow stiffening trusses. Analyses and model studies indicate it to have added stiffness under aerodynamic forces as well as high vibration damping capacity.

at least to retain the economies of our modern design. This has led to careful, though as yet incomplete, investigation in the field of decrease in pressure areas or change in shapes, and also to the raising of a question regarding the most recent step in design, the use of girder stiffening members. There is considerable danger that conclusions will be too hastily drawn in this latter respect, and that the major blame for the Tacoma Narrows failure will be placed upon the girder stiffening members. They do cause air stream disturbances of greater localized intensity than trusses, but consideration must be given to the fact that the Golden Gate Bridge, with deep and heavy stiffening trusses, also has a tendency to undulate in a high wind. Lack of stiffness, therefore, is not confined to girder-stiffened structures.

Roebling had weak stiffening trusses when compared even with the stiffening girders of today. The criterion of strength required by him was the ability of this member to distribute live loads to the main cables just in sufficient amount for the elimination of local deflections. Present-day girders do this, besides lending some stiffness to the suspended structure; and they are economical. An arbitrary retreat from their use would indicate temerity out of keeping with modern engineering and design, but it will be necessary to retreat temporarily, until the general problem is solved in the instance of such long span structures as the Golden Gate Bridge. Today we have available the new tool of model analysis with which it will be possible for us to determine conclusively the relative effectiveness of all types of stiffening members and appliances on suspension systems.

Among the list of remedial measures, two carry promise of providing the stability lacking in some of the recent designs. They are decrease in air pressure areas and/or the provision of additional bracing. It appears that desired economies make it necessary to find the measures there rather than by increasing weight or by strengthening stiffening members. This is especially evident when we consider the weight and stiffening truss strength actually built into the Golden Gate Bridge, where oscillations occur despite great weight and strength.

The possibilities of gaining stability by decreasing areas on which aerodynamic pressures can act appear to be greatest through venting of floors and curbs, including a judicious use of open grid flooring. Roebling considered the probability of an upward wind force, acting on the lower side of the bridge roadway, amounting to 50 lb. per sq. ft. over all or part of the main span. It has been evident, in the failures to date, that they have been caused by the translation of more or less horizontal wind forces into vertical forces. We can conceivably reduce the horizontal pressure area, on which the vertical forces act, by as much as 75 percent. The proper use and placing of flooring should receive the careful consideration of the profession and be studied along with variations in member shapes by laboratories having the facilities to do so.

With respect to bracing there is a strong possibility that the desired stability can be secured by use of some of the old methods or, if not, by the development of new designs. The old check stays, in somewhat modified form, have apparently proved effective on some of our modern projects. Instead of anchorage in the tower, as Roebling provided, these new check stays have been attached to the ends of the stiffening members. It would seem that the old method might again be successfully used, provided an improvement were made by running the cables into the towers at about bridge floor level over sheaves, maintaining tension in them by the use of counterweights, and controlling such movements as occur by means of simple hydraulic snubbers which would resist, to the strength of the stay, any motion of the cable. Such an appliance would be very simple in its design for a particular structure, whether before or after its construction.

Some use has also been made of stays (also similar to Roebling's) over the tower tops in stabilizing modern structures. Of course no attempt has been made to use them as extensively as Roebling did — he states in his preliminary report on the Brooklyn Bridge that "the weight of the superstructure without the cables will be 2,675 tons; . . . the supporting power of the stays alone will be 15,000 tons, ample to hold up the floor"! In connection with this subject of tower top stays, Roebling of course used rigid towers and attached to their tops only a portion of his diagonal stay cables, passing another portion over movable shoes on the tops of the towers, in this way possibly introducing a resistance factor similar to the friction over the tower tops found to be effective in some of the recent model tests. While it is doubtful that the profession will again make an extensive use of Roebling's method of tower top staying, they may find that his rigid towers, by permitting the introduction of friction at their tops, have a modern merit not only in retarding main span vibrations but also in damping out synchronous participation by the side spans.

Roebling was, and the members of the profession today are, conscious of the value of triangulation in stress carrying members for securing stiffness. With this principle in mind we have made some investigation of the possibilities of stiffening modern suspension bridges by use of a system of triangulated suspenders. The study indicates an inherent tendency toward the rapid damping of vibrations and apparently permits of reasonably accurate analysis.

The system of bracing would consist of triangulated suspenders, using steep slopes to prevent members from going seriously out of action under extreme conditions of temperature and live load. Such a system, in conjunction with a shallow stiffening truss, is shown in Fig. 2 above.

The suspenders would each consist of stranded galvanized steel bridge ropes, the main cables would be either of the parallel wire type or of twisted bridge strands, and the stiffening members could be trusses. The suspender ropes would be prestressed and prefabricated to their correct lengths for normal temperature and full dead load, for which conditions pairs of suspenders would be equally loaded and the cables and trusses would have no axial stresses arising from the stiffening action of this suspender bracing system. Under live load, temperature and wind, however, the suspenders would deliver components to the cable and truss to cause these members to act to some extent as chords of a deep truss, tending to stiffen the bridge. When alternate suspenders go out of direct action, as a result of large bridge deflections, or approach that condition, they would cease to act in a purely elastic manner, and quickly tend to damp out any vibration or undulation.

It was assumed in the method of analysis that the main stiffening member has negligible stiffness in comparison with the cable polygon and the superimposed bracing system. The further assumption was made that its primary function under vertical loads is to support the deck between panel points and to act as a bottom chord of the bracing system. The bending stresses in the stiffening member are determined finally, however, from the variations in curvature of the entire system of which it is considered to be a chord, plus its local bending stress due to its support of the deck.

In analyzing a stiffened system in which some of the members drop out of direct action through inability to take compressive stresses, it has been found to be impossible to apply the theorem of least work, which is commonly employed for trussed structures with redundant members. It is necessary, therefore, to approach the problem geometrically, finding from the changed positions of the panel points of the system, due to load and temperature, the apparent stretch or shortening of the various members, from which the individual stresses may be determined.

The changes in the position of the panel points are found by first determining the vertical and horizontal deflection curves of the free cable of the whole suspension bridge under live loading and temperature, ignoring the bracing action of the suspenders; then determination is made of the changed positions of the stiffening member points due to temperature and deflection; and from these data representative calculations of stretch and shortening of suspenders are made. Curves plotting these representative results over the length of the bridge facilitate these calculations for the whole structure. Somewhat less than 100 percent of these values should be used in the remaining calculations to allow for the stiffening of the cable polygon by the bracing system. Some stretches and some shortenings when translated into added suspender loads will be impossible in the light of the loads that the suspenders may possibly get, and are "cutoff" in accordance with the principal that no suspender can take a compressive stress under live load and temperature greater than its original dead load tensile stress, or under the working assumptions, a *total* tensile stress greater than the total load of one panel.

Having these tentative suspender pulls, their components to left and right are summed up algebraically in each span and must equal zero or the truss will be pulled horizontally until they are zero. A simple calculation may be made to show the effect on these components by a shift of the truss of one inch, and a trial will show how far to one side the truss is pulled and what the final components are. With these final components, it is possible to compute the chord stresses and from them the resisting moments created by the bracing system.

When these resisting moments are subtracted from the live moments at various points in each span, the net moment is that which actually tends to deflect the cable, and it was found to be about 90 percent of the total live load moment in our analysis of the particular structure studied. The stiffening effect of the suspenders is not greater because of the relatively low modulus of elasticity of suspender rope, but this in turn is of great advantage in damping vibrations.

To verify the damping action and the extent of stiffening effect of this bracing system, a small scale model was made, covering one cable plane of the main span of the assumed structure. This model was 11.5 feet long. Equipped with a suspender system of the triangulated type, it damped out vibrations eight times faster than when vertical suspenders were used. It might therefore be expected that this system of cable bracing, if applied to an actual bridge, would slightly stiffen the cable polygon against static loads and would also quickly damp out vibrations and prevent the building up of aerodynamic impulses to the point where they become dangerous. We suggest that tests be conducted on a larger model under laboratory conditions in order to establish these findings more fully.

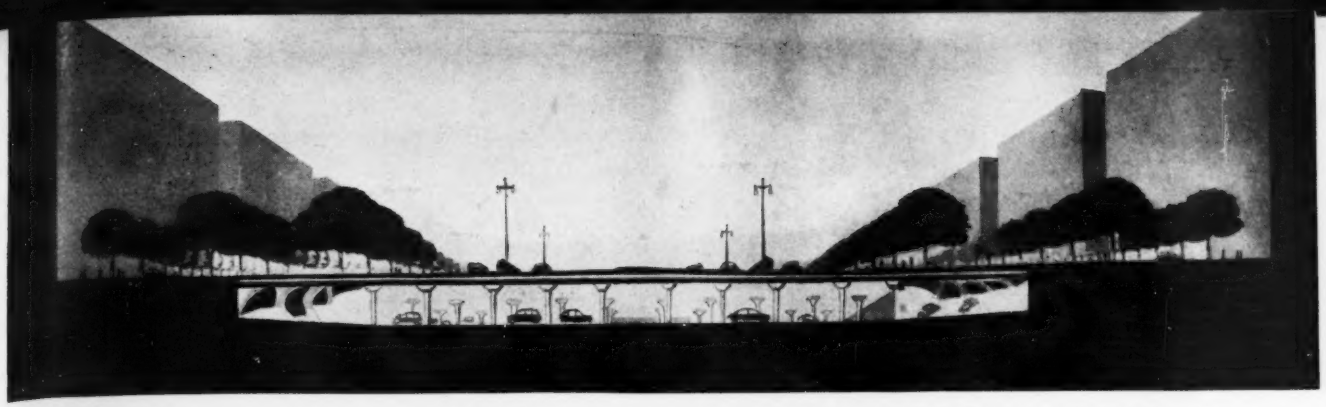
To repeat the statement at the beginning of this article, the bridge engineering profession is today under obligation to answer and remove the question that has arisen regarding the safety of long-span suspension bridges. Roebling stood alone and answered a similar question in 1867. In 1941 we have materials not known in 1867, and our knowledge of structures and materials has increased from the more or less cut and try methods of his time to almost an exact science. It will be strange indeed if another new long span suspension bridge should prove to be aerodynamically unstable.

Health Aspects of Housing Recognized in Connecticut

The Connecticut State Department of Health has given recognition to housing as a field of public health activity in creating a full-time housing division in its bureau of sanitary engineering according to the National Association of Housing Officials.

The Connecticut housing division, headed by a housing engineer, will advise local health officials on problems of housing inspection and enforcement of building laws. It will cooperate with local health and housing officials in conducting special housing surveys in congested urban districts, and will concern itself with problems of water supply and sewage disposal in areas not served by public facilities.

The first job undertaken by the housing division is a critical review of the present state tenement and lodging house laws, looking toward possible revision of these laws in line with modern practice elsewhere.



Cross section through Avenida Nueve de Julio showing the underground parking garage, which required clearing an area one block wide and five blocks long. Roof and street support is a flat slab carried on concrete columns.

Underground Parking Aids Traffic Handling in Buenos Aires

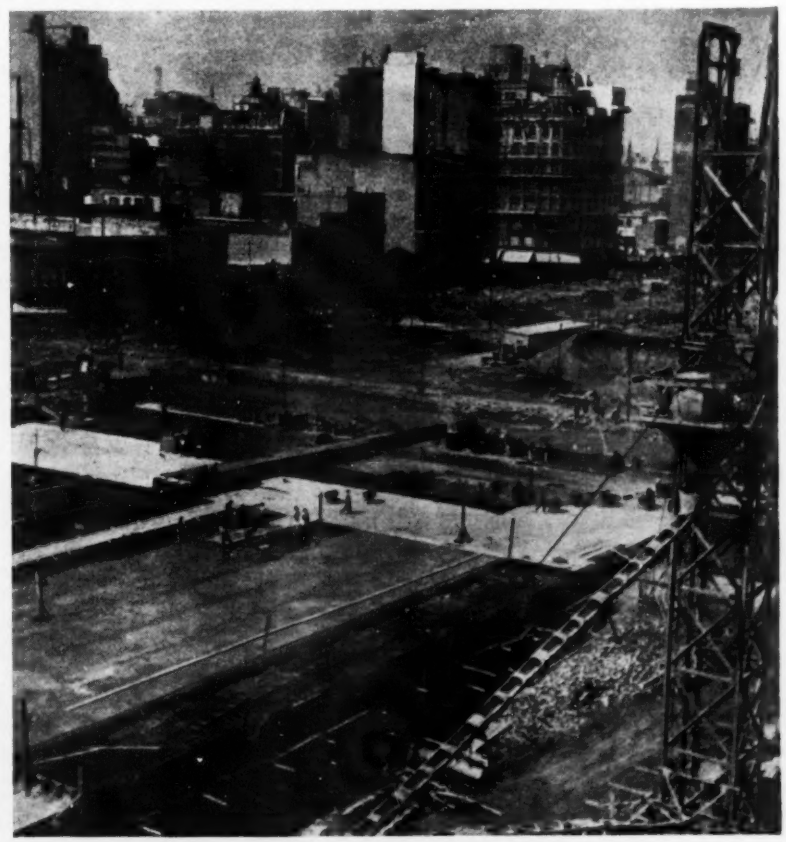
F. A. Zamboni
City Engineer, Buenos Aires, Argentina

THREE YEARS AGO the first two municipal underground parking lots in a program contemplating a total of eight such traffic relief facilities were placed in service in Buenos Aires. These two initial units, with a capacity of 756 cars, have proved a distinct aid in relieving traffic congestion, and their operation, which includes a mechanical ventilation system, has shown that such facilities can be made self-liquidating through a small parking fee (about 15 cents) and rents from sales rooms, repair shops and poster advertising. Because the results have been so satisfactory it is hoped that the entire program, providing accommodations for 6,770 cars, can now be completed.

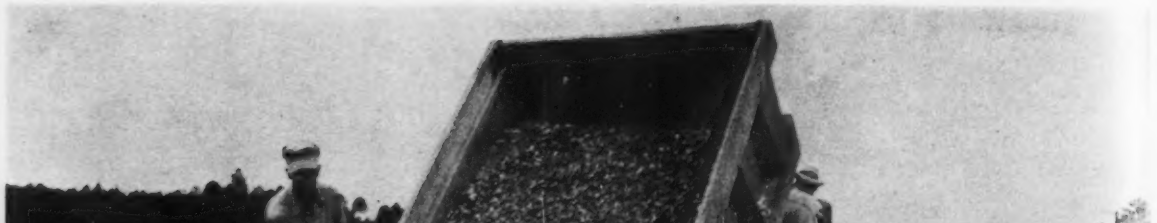
The first two subterranean parking garages were built in connection with the widening of the Avenida Nueve de Julio for which a strip of old buildings a block wide and five blocks long was removed; eventually it is planned to extend this tree-lined boulevard completely across the city, but the expense will be large since the work so far completed, including the underground parking garages, cost over $6,000,000 (U. S.).

The commercial area of Buenos Aires, where traffic congestion is greatest, is located on the rim of the city, rather than near the geographical center, as is the case in many cities. Subway lines radiate in three directions from this commercial area, and it is on these lines near the limits of this area where the remainder of the parking facilities are to be built. The two existing parking garages, however, are almost in the center of the commercial area.

The accompanying illustrations give some idea of the two parking garages already built. Both are 200 ft. wide. One is 800 ft. long, the other 400 ft. Ramps, each made up of three 11-ft. lanes, give access to the garages on either side; experience in operation has indicated that two lanes would have given ample capacity. The garage structure is of reinforced concrete, columns with flaring capitals carrying 18-in. deep flat slab panels 20 x 25 ft. in plan. The ceiling height in the garages is 15 ft. Although these garages are all on one level, several of two-story type are planned for the future program.



Building underground parking garages in Buenos Aires. This one is located beneath the Avenida Nueve de Julio which has been widened by removing an entire block width of old buildings.



Spreading coarse aggregate on application of hot MC-5 asphalt sprayed directly on old pavement. Aggregate flow is regulated by a special tailgate, with the opening manually adjusted to backing speed of truck.

Rejuvenating an Alabama Road

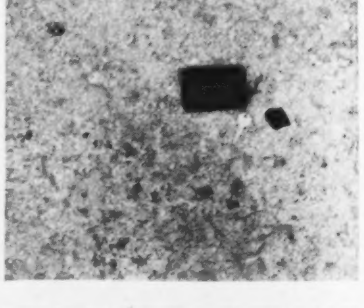
***Contents in Brief**—Alabama is widening and resurfacing deteriorated pavements, using state equipment and state or WPA labor on experimental and "pilot" sections. When the method is perfected competitive bids will be asked on similar construction. Present work is a light penetration cover, a 2-in. leveling layer of plant mix and a two-course wearing surface.*

THE ALABAMA highway department has found it necessary to recondition the surface on a considerable mileage of road on which the alignment and grades are fairly satisfactory but the pavement is poor and narrow. WPA forces, and penal and hired labor, are engaged in widening and resurfacing work on a program that is partly experimental to determine a satisfactory method for doing the work, and its approximate cost. It is expected that considerable work of this type will be offered for competitive-bid contracts after the method is fully developed.

Procedure is to widen the existing pavement to 24 ft. with crushed stone or local modified earth type base material, then repair bad areas in the paving surface, and finally apply a light penetration macadam to a 22-ft. width. This is followed, either immediately or after an interval of a year or two, as the surface requires and funds permit, with a 2-in. leveling application of plant-mix bituminous material and a two-course surfacing placed with a blacktop paver.

Operations on U. S. 31 north from Birmingham consists of placing a light penetration course on one section, laid with use of penal labor, and the full treatment applied at another location, placed with WPA labor. In both cases the highway department furnished the equipment and the skilled operators as well as supervisory forces. The original pavement on this road was portland cement concrete, 18 ft. wide and 9–6–6–9 design thickness.

The first operation was widening the existing pavement. A 3-ft. width of trench on each side of the pavement was excavated by power equipment to the full 9-in. depth of the pavement, and all this material was hauled away. Then, in operations,



(Above) Surface of light penetration application over old concrete. (Below) Leveling course of large material, which will be covered with a wearing course at a later date.

where crushed stone was used, the excavated strip was partially filled with a 5-in. layer of crusher-run stone from 2-in. down to ½-in. size, rolled and choked with 10 percent local soil binder and again rolled until solid. Subsequently, 5 in. more material was placed and rolled, screenings were added and the widened strip rolled to the level of the old pavement. An application of ¼ gal. per sq.yd. of RT-3 tar prime made the road ready for traffic.

Any packing down that occurred on the new shoulders was built up by cold patch methods. Likewise, existing shattered areas in the pavement were cut out and filled with cold plant-mix, tamped with a flat plate on a pneumatic pavement breaker.

Light penetration treatment

The light penetration treatment was applied to a 22-ft. width of road, 15 ft. one day followed next day by a third strip 7 ft. wide, thus permitting maintenance of almost normal traffic. The pavement was swept clean, then 0.35 gal. per sq.yd. of MC-5 asphalt oil was applied hot to the surface by a bituminous distributor. This was covered with 0.85 cu.ft. per sq.yd. of 1½-in. down to ¾-in. stone, spread through a special tailgate on a backing truck. This distribution was "spotted out" by hand application of rock to produce a uniform surface over the entire area. The surface was first broomed by hand. A rotary mechanical broom followed, to assist further in leveling, and the surface was then packed by 7- to 10-ton tandem rollers. The next operation was dry choking with .08 cu.ft. per sq.yd. of material passing a ¾-in. screen but retained on a No. 8 screen, followed by further brooming and rolling. An additional 0.55 gal. of MC-5 was then applied by a pressure distributor followed by 0.27 cu.ft. of the ¾-in. to No. 8 stone. Brooming and rolling continued for two days though traffic was turned on the road as soon as all materials were in place.

This treatment has been found satisfactory to preserve the existing pavement, to provide a safe driving width and to act as a binder for the subsequent courses. It leaves a rough textured surface, which is expected to last for several years under moderate traffic.

Average rate of application of this penetration surface was about 1,000 sq.yd. per hour, which could probably be attained with one distributor though two are generally used. Total cost is 18c. per sq.yd. for all material and labor. Prison labor in use on this construction costs the highway department about 20c. per hour, which includes supervision and overhead charge. The prevailing common labor rate is about 25c. per hr., but nearly all unskilled work is done by prisoners. Equipment rental charged into the cost is: 4-yd. trucks, $1.15 per hour; tandem rollers, $1.00; distributors, $3.50, including fuel and repairs, but not operators.

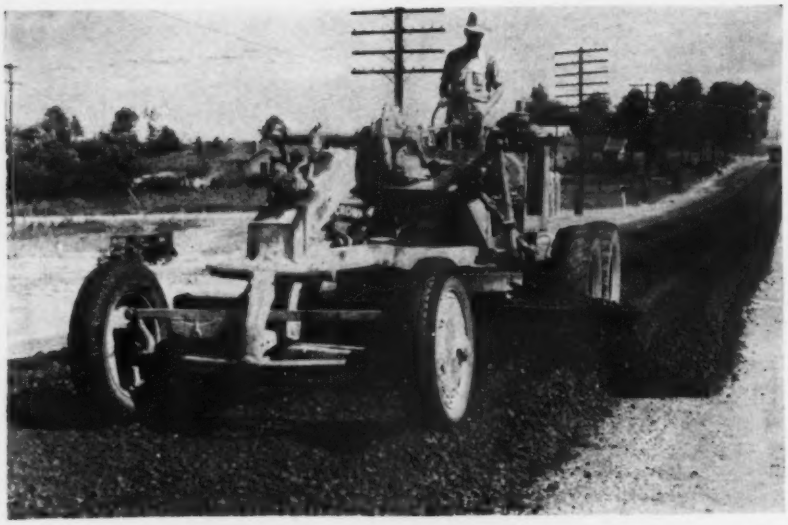
Bituminous distributor applying top shot of asphalt. Two swaths 7½ ft. wide are completed one day and traffic carried there while final 7-ft. width is placed the next day.

"Spotting out" thin coverage or low spots in the surface by hand is followed by brooming and by rolling with a 7 or 10-ton tandem roller.

Leveling and surface courses

Either immediately, or as funds become available, a better paving is added over the light penetration course. This levels up minor irregularities in the pavement, permits superelevating where desired and in general gives a completely new, full width, 60-mph. design road, making use of labor available to the state at low cost. The leveling and surface course applications described here were done by WPA with no special effort made to reduce the number of men or time required. The WPA furnished the labor necessary and most of the material for the work while the state supplied all equipment and key supervisory forces.

The leveling and surface courses placed over a light penetration application were of hot plant-mix material



Spreading leveling course of plant mix after being dumped by trucks. Material is spread to 22 ft. on base widened to 24 ft.

Old traveling plant, with drier added, set up as stationary plant in quarry to produce hot plant-mix surfacing material.

produced with state equipment by WPA labor. An old traveling plant, with a drier added, was set up at a limestone quarry where aggregate for construction was produced and processed. In that plant various sizes of material were batched by hand shoveling into trucks or truck-hauled buckets to a "filling line" painted on the inside of the truck or bucket. Aggregate was proportioned as follows: 60 percent coarse aggregate 2 in. to $\frac{3}{8}$ in. in size; 30 percent of $\frac{3}{8}$-in. to No. 10-screen size; 10 percent local fine sand, 75 percent passing No. 40 screen.

About 4 percent by weight of 120-penetration asphalt, with ten percent kerosene added to make approximately an MC-5 application, was mixed with the heated aggregate. Hauling was done in 1½-ton nominal capacity trucks transporting an average load of 4 tons.

When the trucks reached the roadsite the material was dumped in windrows along the center of the road, using a chain on the tailgate for partial regulation of the distribution. Over most areas application was at the rate of 140 lb. per sq.yd. or about 2-in. depth after compaction. However, for superelevation of the road at curves, none of which was done in the original construction, thicknesses up to 18 in. were used to give a smooth riding curve at 60 mph.

Motor-powered road patrols straddled the dumped material and spread the plant-mix evenly over the area, depending mainly on the eye for a smooth surface as grade stakes were set only at superelevated or relocated sections. Ten-ton rollers were then used to compact the plant-mix materials. The 2-in. course was placed in one layer but where the layers exceeded 4 in. the material was placed in two or more passes as required and each one rolled to secure compaction.

Wearing Surface

After a lapse of about a week, during which traffic was permitted on the road, a two-course wearing surface was applied. First layer was a ¾-in. leveling course using aggregate ⅜ in. and down in a hot plant-mix with 5 percent by weight of bitumen, hauled from the same quarry-plant setup. The material was placed with the usual blacktop spreader and then rolled for compaction.

The finish or top course was also ¾ in. of asphaltic concrete with the same maximum size aggregate but with a higher percentage of sand and 6 percent by weight of bitumen. This course was also placed with a blacktop spreader and rolled to compaction with 10-ton tandem rollers.

Where the WPA applied the light penetration course, as described first above, the cost was about 37c. per sq.yd., of which the state contributed 12c. The WPA labor rate was 37½c. per hour for laborers who came mostly from the Birmingham area. The cost of the light penetration leveling course and the two surfacing courses was about $1.50 per sq.yd. with WPA labor.

Educational Jobs

The long-range reason for this state work is to develop new methods of operation with the materials and conditions existing in Alabama. Careful and complete costs are kept with full information on the type of labor and equipment employed. After the method is fully developed the complete records of costs and operations will be shown contractors and they will be asked to bid on similar work. If bids are lower than the state finds their costs the work will be let to contract, contractors being encouraged to hire the state employees who have worked on the present operations.

Chris J. Sherlock is state highway director of Alabama. Leon Gottlieb is state bituminous engineer.

A SPECIAL SECTION ON

DEFENSE-DEVELOPED BUILDINGS

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ENGINEERING NEWS-RECORD

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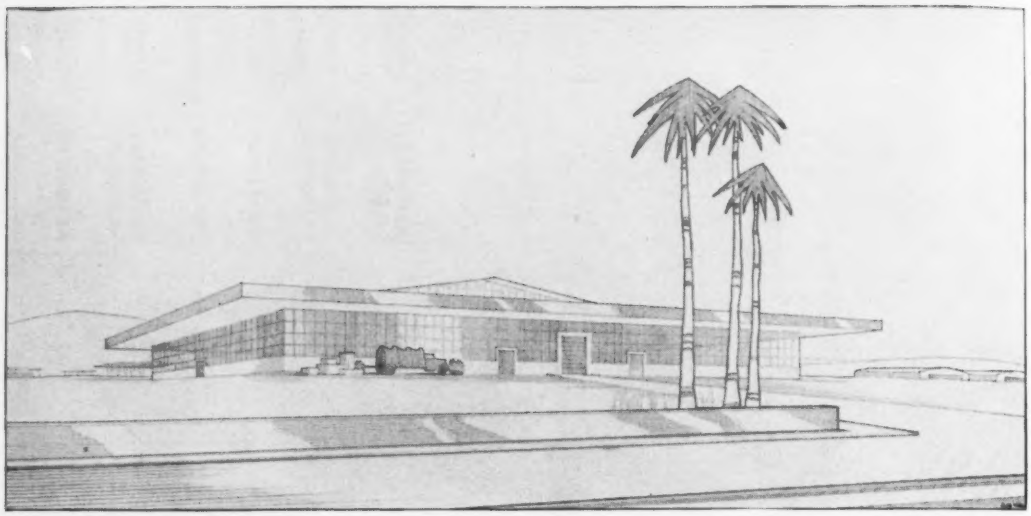
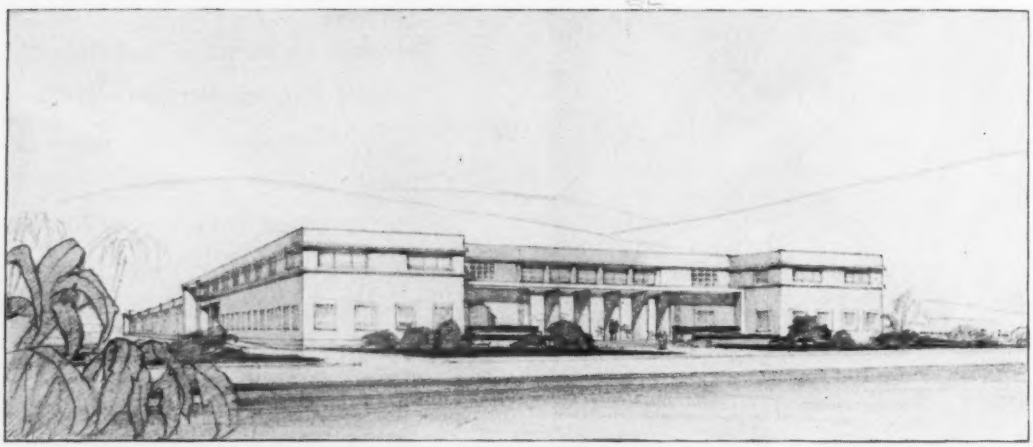




At Defense Outposts

Engine Repair Shop (upper) at Albrook Field in Panama, shows the tropical influence with its insect screens for walls and 22-ft. cantilevered canopy. The shop is of reinforced concrete and steel design, almost square in shape, and covers about one acre.

Steel trusses support the roof which has a center clerestory inclosed with insect screens and provided with a 5-ft. overhang to protect against rain.

Encircling the main building is a 22-ft. cantilevered canopy, which is actually a continuation of the lower roof. The area between this canopy and the concrete base is closed with a series of insect screens about 20 ft. high.

A monorail system provides for handling aircraft engines which will be repaired and overhauled in this building.

Depot Supply Building (lower) at the Puerto Rico Air Base of the Army covers four acres and has provisions for full blackout protection and was designed to be earthquake-resistant and hurricane proof. The two-story structure of reinforced concrete is about 880 ft. long and houses facilities for shipping and receiving, bulk, dry, refrigerated and air-foil storage.

Behind the headhouse is the shipping and receiving section with 24-ft. clear height and rigid frames 60 ft. long and 4 ft. deep.

The roof over the air-foil storage part of the building is supported on 120-ft. concrete arches, with 20-ft. cantilevered connections. The slab extends 16 ft. as a cantilevered canopy.

Both structures were designed and erected by the construction division of the Quartermaster Corps.

Defense Demands Cause a Building Boom

WAR TODAY DEPENDS upon machines more than upon manpower. Consequently, the factory transcends the recruiting office, and defense worker housing assumes equal rank with troop cantonments. The material turned out by the many new factories requires huge storage warehouses; the machines produced beget service and repair buildings of large and diverse types; specialized buildings for both Army and Navy come off the drawing boards in an endless stream. Structures come first, before either guns or butter. And they have come in such quantity as to create a building boom of proportions never before equalled.

Because of this boom in buildings, construction volume for nine months of this year reached $4,844,000,000, or more than for any other twelve months in history. Just taking industrial buildings as an example, which, before Hitler, harked back to 1929 and its 550 million dollar volume as an all-time record, we find that 1940 contracts soared to 929 millions, including 335 millions of federally financed factories. And further, that not even this is tops, for in the first nine months of 1941, the industrial building total is already made up of 1,117 millions of federally-financed plants and 400 millions of private factories. Industrial building for 1941 can readily reach a volume of 2 billion dollars, four times 1929's great total. When it does, it will be just about double all of the construction of every type that was recorded in the great World War year of 1918. Modern war is indeed fought with buildings as well as machines.

This issue is devoted to a presentation of the designs of some of the defense-developed buildings, particularly those of special type for which the Army and Navy construction branches are directly responsible. Monuments to the knowledge and skill of the civil engineers of the Navy's Bureau of Yards and Docks and of the Army's Quartermaster and Engineer Corps, these special structures furnish, in many of their details, a basis and an incentive for important advances in the engineering art. Both the buildings and the men responsible for them merit the recognition that this issue attempts to establish.

No less a badge of honor is due the designers of the factories and housing of defense, and the manufacturers of construction materials and equipment that, in the final result, have made these structures possible.

Week after week during the past year, the pages of this journal have carried articles on these types of defense-developed buildings, and they also are recalled in a special article in this issue.

Building for defense is history in the making. Like all history, the full import of the great events that are taking place cannot now be appreciated. But there are elements that can be separated from the whole and their significance examined and evaluated. That is the purpose of the dozen articles that make up this special section on defense-developed buildings.

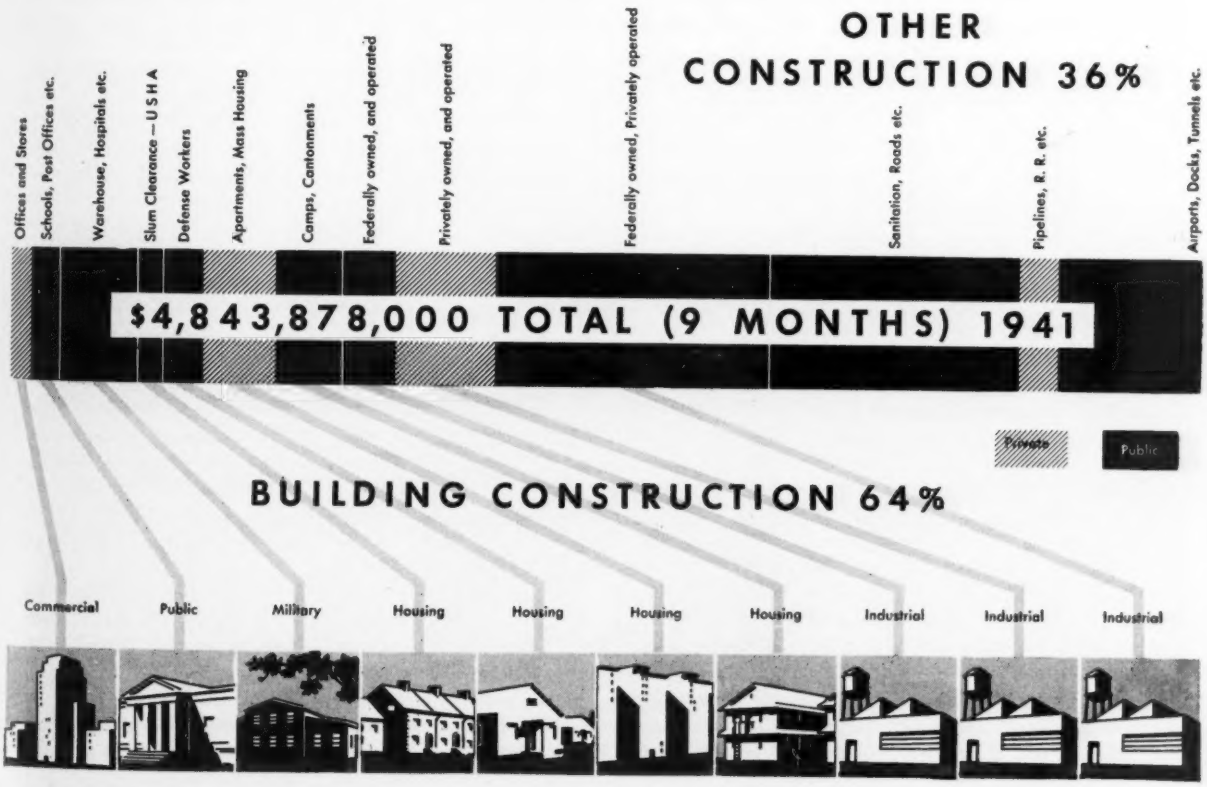


Fig. 1. Main building of Naval Medical Center is dominated by a 20-story tower.

Precast Facing Used on Navy Hospital

Hugo C. Fischer
Commander, (CEC) USN, Bethesda, Md.

***Contents in Brief**—Buildings housing medical schools and hospitals for Navy Department at Bethesda, Md., have walls faced with 400,000 sq.ft. of precast exposed aggregate concrete panels in place of the usual natural stone. Some buildings are 3 and 4-story concrete frames with free standing walls, and there is a 20-story structural steel tower building with curtain type walls. Backup is brick and walls are furred with tile on inside. Some 500 different shapes of panels are used. Mechanical and electrical facilities of buildings are unusually complete.*

THE NEW NAVAL MEDICAL CENTER under construction at a cost of $7,500,000 at Bethesda, Md., about three miles north of the District of Columbia boundary, consists of a large group of buildings in a relatively compact arrangement on a 265-acre site. Mostly 3 or 4-story reinforced-concrete frames, but with some wall-bearing construction, the group is dominated by a 20-story steel frame tower on the main building, and is principally notable from a design standpoint for its use of architectural precast concrete panels as the exterior facing on a majority of the walls. Not only is this probably the largest installation yet made of this relatively new product, but it involves a larger variety of shapes of panels than has heretofore been attempted.

Central unit of the group is the Main Building whose 20-story axial tower is flanked by a 4-story north wing for the dental school, a 4-story south wing for the medical school, and a 3-story east wing containing operating rooms and accessory facilities (Fig. 2). Basements and sub-basements are provided under the tower and wings. Adjoining the east wing of the main building is a subsistence and recreation building that provides galley, messing, storage and recreational facilities including a large auditorium. Nurses' quarters, located to the northeast of the main building group, provide living facilities for 70 nurses, and hospital corpsmen's quarters, located to the south, furnish living and recreational facilities for 280 corpsmen. Five officers' quarters are located beyond the nurses' quarters toward Rock Creek Park.

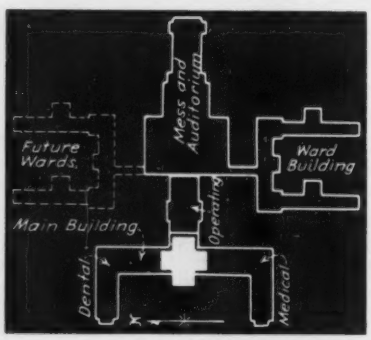


Fig. 2. Central group of buildings at Naval Medical Center. The white cross is location of the 20-story tower.

All of the above buildings are scheduled for completion this year as are a laundry, garage, a central heating and refrigerating plant and two 3-story ward buildings, the latter located directly south of the operating wing of the main building and the

subsistence and recreation building, and connected thereto by corridors. Two additional ward buildings south of the main building and four on the north side are contemplated for the future. Plans and specifications are also being prepared for a research building, animal house, storehouse, shop and utility buildings, and other miscellaneous construction to be placed under contract in the future.

The buildings under construction provide 180 beds on 8 ft. centers in the ward buildings, 152 beds on the 5th to 8th floors of the tower, arranged as wards, and 114 single rooms for sick officers on the 9th to 17th floors of the tower and on the 4th floor of the north wing. Present total of beds is, therefore, 446, which will be doubled when the six additional ward buildings are built. In an emergency the number of patients can be considerably increased by placing the ward beds on closer centers; also many of the single rooms are designed to take two beds. The operating and treatment rooms are designed for the eventual hospital capacity plus extensive out-patient service.

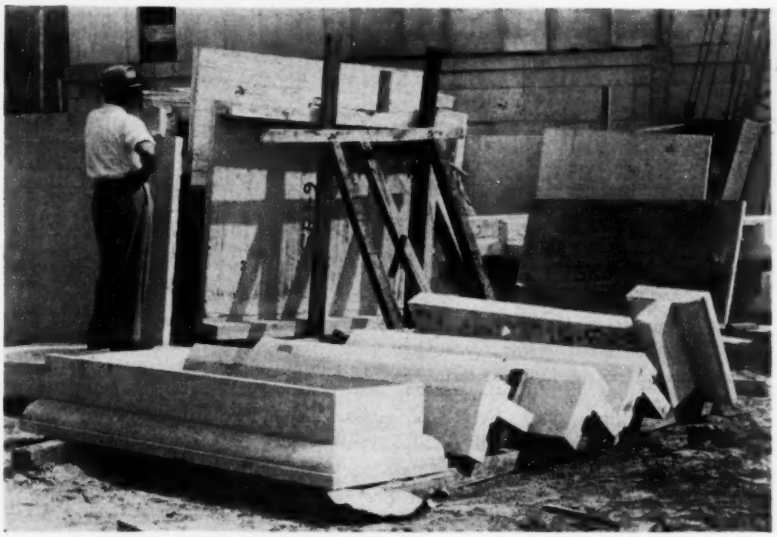


Fig. 3. A few of the 500 different shapes of precast panels. Common to all shapes are the lugs that furnish a positive tie to the brick backing of the walls.

Foundation conditions

Work was started on the construction of the caisson foundations for the tower and wings of the main building in July, 1939. The tower footings are carried to sound gneiss at an average depth of 20 ft. below sub-basement level. The wing footings are on mica schist, which is a disintegration product of the gneiss, at an average depth of 20 ft. below sub-basement level. Design loadings of 45 tons per sq.ft. were used for the gneiss and 10 tons for the mica schist. For foundations of other buildings, carried only to a firm sand-clay-mica soil, which is a further disintegration of the mica schist, a design loading of 3 tons per sq.ft. was used.

The structural frame of the tower is of steel with wind bracing connections of the split I-beam type. Diagonal bracing is provided only in the two top stories. The wings of the main building, the subsistence and recreational buildings and ward buildings have concrete structural frames. Nurses' and corpsmen's quarters are of wall-bearing construction.

Work on erection of the structural steel for the tower was started in March under separate contract while the general contract for the buildings got under way in May, 1940. Other contracts have been let for elevators,

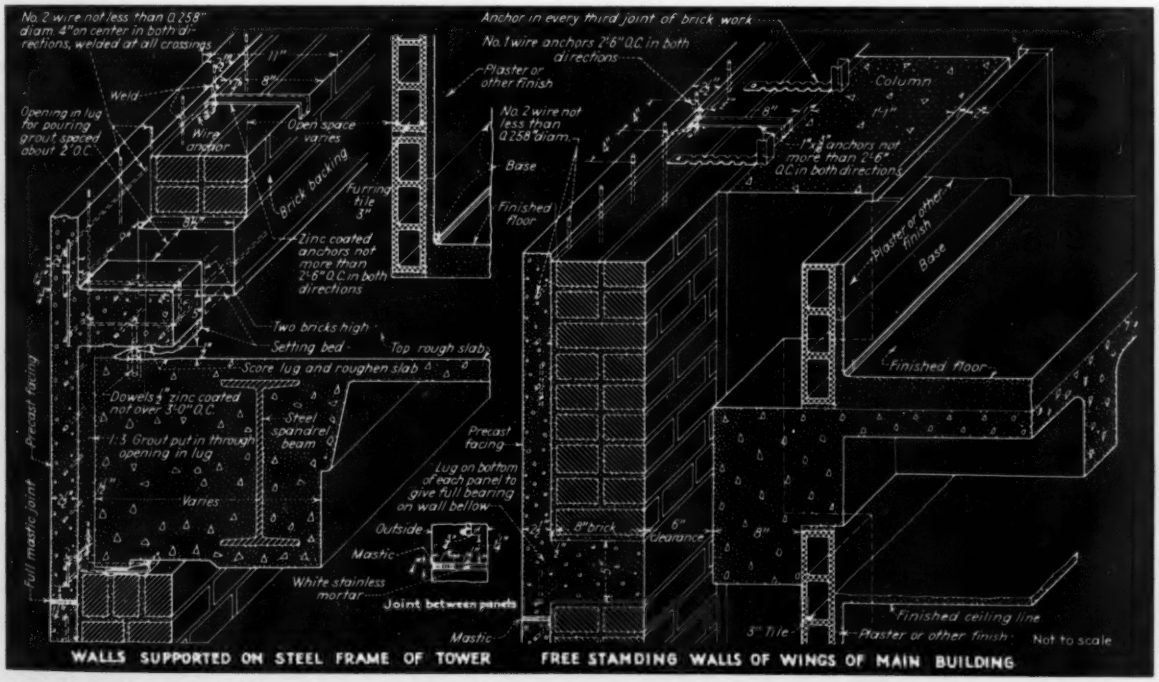

No. 2 wire not less than 0.258" diam. 4" on center in both directions, welded at all crossings
Weld
Opening in lug for pouring grout, spaced about 2'-0" O.C.
Wire anchor
Open space varies
Brick backing
Furring tile 3"
Zinc coated anchors not more than 2'-6" O.C. in both directions
Two bricks high
Setting bed
Top rough slab
Score lug and roughen slab
Dowels ⅝" zinc coated not over 3'-0" O.C.
1:3 Grout put in through opening in lug
Steel spandrel beam
Precast facing
Varies
Full mastic joint
Lug on bottom of each panel to give full bearing on wall below
Outside
Mastic
White stainless mortar
Joint between panels
Mastic
Anchor in every third joint of brick work
No. 1 wire anchors 2'-6" O.C. in both directions
Plaster or other finish
No. 2 wire not less than 0.258" diam.
Base
Finished floor
Column
8"
1½"
1" x ⅛" anchors not more than 2'-6" O.C. in both directions
Plaster or other finish
Base
Finished floor
8" brick
6" clearance
8"
3" tile
Finished ceiling line
Plaster or other finish
Not to scale
WALLS SUPPORTED ON STEEL FRAME OF TOWER
FREE STANDING WALLS OF WINGS OF MAIN BUILDING

Fig. 4. Isometrics of building walls illustrate variations in supporting precast panels on steel and concrete frames.

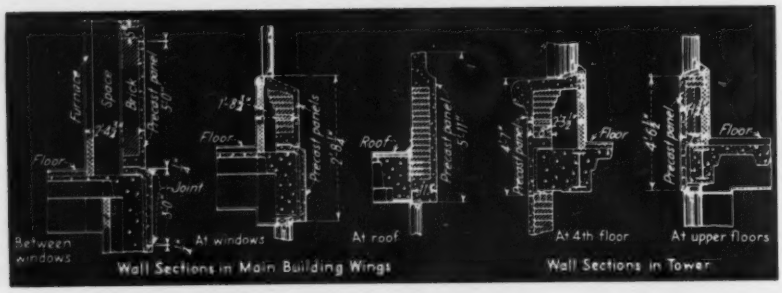


Fig. 5. Typical wall sections, showing how the precast, exposed aggregate panels were shaped to meet various structural and architectural requirements.

exterior services, grading, roads, walks and parking, walls and terraces, hospital and laboratory equipment, etc., to a total number of 24 to date. All work is being performed under the usual competitive lump-sum contracts.

As stated, the outstanding feature of the buildings is the use of precast exposed aggregate panels for the wall surfacing. These panels (Fig. 4) backed with brickwork, form the exterior surface of the main building, ward buildings, nurses' and corpsmen's quarters, laundry and heating and refrigeration plant. This material was first used by the Navy on a large scale for the exterior facing of the Naval Model Testing Basin at Carderock, Md., where the panels served as face forms for the structural concrete walls and pilasters. This method of use, however, was not considered practicable for the tall building of this project because of the delay involved in forming and pouring the backing concrete for each course of panels before the next course could be set.

Making the precast wall panels

The precast panels of the Medical Center were made in a plant at Woodbridge, N. J., and transported by railroad truck to the job. They have a general thickness of 2½ in., of which the face inch is mainly a mixture of translucent and opaque quartz with white cement, although colored aggregates are used on the spandrel panels of the tower and elsewhere for spandrels and trim to add variety and interest in appearance. Including the setting lugs, returns, sills, copings, etc., that were cast integral with the facing, the panels average about 3½ in. in thickness of concrete, of which all but the face inch is a standard concrete of usual sand and gravel aggregates made with ordinary portland cement. The brick backing is uniformly 8 in. thick.

The proportions of both facing and backing mixes were 94 lb. of cement to 105 lb. of fine aggregate and 305 lb. of coarse aggregates, requiring about 7⅓ bags of cement per cu.yd. The coarse aggregate had a fineness modulus of 5.00, all passing a ¾-in. square mesh sieve and retained on a No. 50 sieve. The fine aggregate was a sand made from the same rock as the coarse aggregate (for the facing) with a fineness modulus of 1.35.

It was necessary to use about 6 gal. of water per bag for the facing mix to insure a satisfactory surface, but the quartz mixture bled fast and, by vibration and working with trowels, about 1 gal. was removed before the drier backing mix was placed, which also absorbed some of the excess water in the facing.

The panels are reinforced with 4x4-in. galvanized wire mesh made of ¼-in.-diameter wire and fabricated into cages by welding. The cages were dipped into hot pitch, after all cutting and welding had been completed, for maximum protection against corrosion.

Some 500 different shapes of panels are included in the total of 400,000 sq.ft. of facing used on the different buildings. Considerable ingenuity was required in the design of the molds, and high-class joiner work with heavy rigid construction was necessary to maintain the close dimensional tolerances allowed. Some of the more complex molds were made in plaster.

As soon as the castings could be

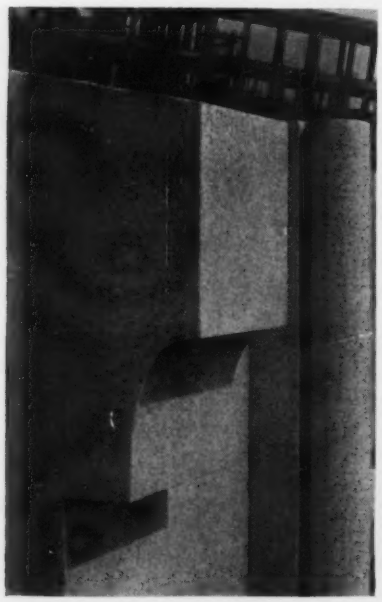


Fig. 6. Quartz aggregates and white cement create distinctive texture.

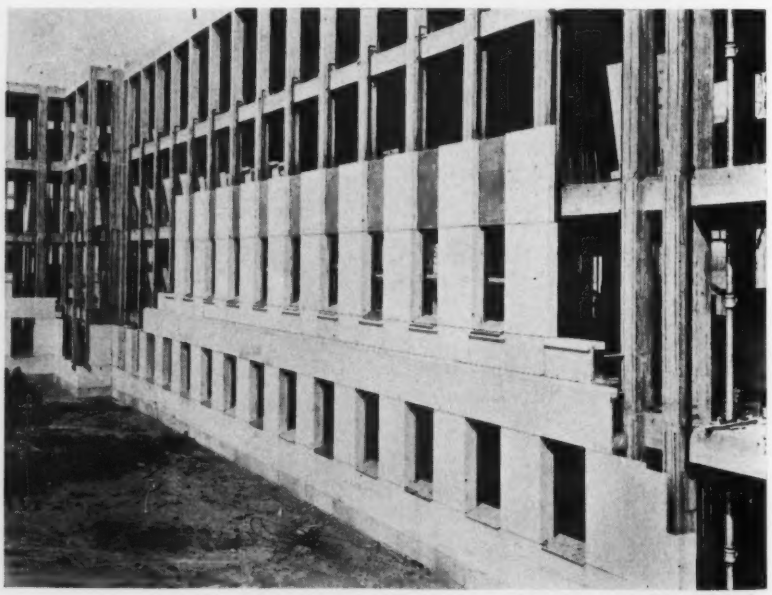


Fig. 7. Precast panels in the concrete buildings are free-standing, being anchored to but not supported by the frame. Fig. 4 illustrates the method.

removed from the molds, averaging about 16 hr. after pouring in temperature of not less than 65 deg. F. maintained in the plant, the face aggregate was exposed by electric-driven disk sanders and cleaned with a light acid wash. Minor repairs were made if necessary, and the panels then kept wet day and night under double thicknesses of muslin for 5 days. Final inspection was made in direct daylight and such retouching with light acid done as might be required before shipment. Minor damage in transit was repaired by expert workmen at the site.

Fig. 4 shows, at the left, the method of mounting the precast panels on the spandrel beams of the structural steel framing of the tower as originally proposed. In actual construction it was found simpler to run the reinforcement of the setting lugs directly through the 9-in. gaps, indicated on the drawing to be filled with brickwork, to drill holes for the anchorage dowels in the spandrels within the area of these openings, and then fill the gaps in the lugs with concrete, instead of brick, at the time the grout filler between the face of the spandrels and back of the panels was poured. This provided a very effective anchorage and avoided the difficulty of matching holes for the dowels in the structural concrete and panel lugs.

Fig. 4, at the right, shows the typical setting of the precast panels for the walls of the wings of the main building, of the ward buildings and of other 3-story construction. These walls are free standing, being anchored to but not mounted on the structural concrete frame.

The method of securing precast panels to the concrete walls of basements previously poured in place is illustrated in Fig. 8. Various modifications were used in actual construction but none was entirely satisfactory. The insert rods were difficult to place, particularly under integral window sills, and it was necessary to shore the panels heavily to hold them against the pressure of the grouting. This method of construction has been used satisfactorily in mounting interior panels of "plastic mosaic" but is not considered desirable for exterior panels where a more effective anchorage and seal is required to resist the effects of weather conditions. The panel should either have been used as face forms for the concrete walls as at the Naval Model Basin or backed with brick or other masonry as used elsewhere on this project.

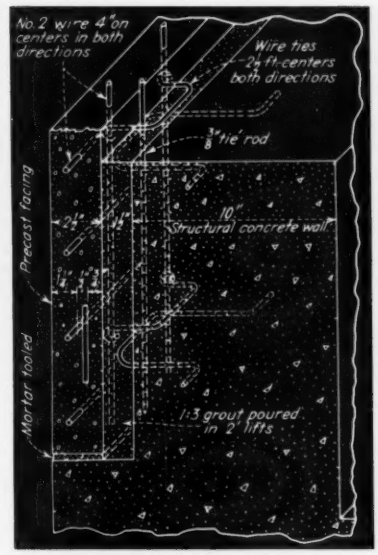

No. 2 wire 4" on centers in both directions
Wire ties 24 ft. centers both directions
3/8" tie rod
10" Structural concrete wall
Precast facing
Mortar tooled
1:3 grout poured in 2' lifts

Fig. 8. Method of anchoring precast panels direct to basement walls is not as satisfactory as using cast lugs and brick backing.

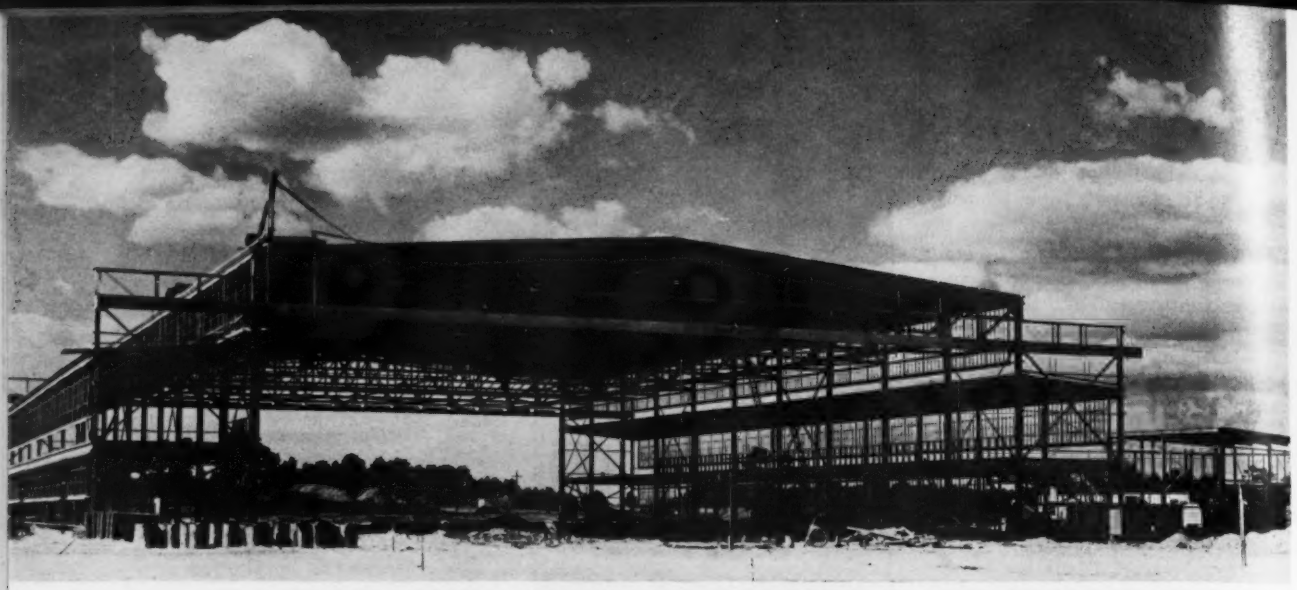
It will be noted that the architect has a greater freedom in placing joints where desired for architectural effect and that the cast panels allow a more integral construction for watertightness than is practicable with natural stone. Also, the range of colors, by using various natural stones and manufactured ceramics and glasses for aggregates, is practically unlimited.

Some natural stone was also used on the exterior, including granite bases, terraces and steps, and a black serpentine for the spandrel panels of the wings of the main building. A variety of interesting marbles is used on the interior and a large part of the wall surface is faced with architectural terra cotta. Acoustic tile is used for practically all ceilings.

The mechanical installation provided for in the buildings contract includes: the usual plumbing systems and gas, compressed air and vacuum piping, as well as the heating, steam, ventilating and air-conditioning systems. Heating is mainly by direct radiation, zone-controlled. Convector units and in some cases direct blower heater units are also used. Complete air conditioning is only supplied to operating rooms and lecture rooms. The electrical systems include not only the usual power and lighting installations but many special services such as loud speakers, x-rays, radios, etc.

The buildings were designed by the Bureau of Yards and Docks, Rear Admiral Ben Moreell (CEC) USN, chief of the Bureau, and Frederic W. Southworth, project manager, to meet the requirements set forth by the Bureau of Medicine and Surgery, Rear Admiral Ross T. McIntyre, Surgeon General of the Navy, Paul P. Cret, Philadelphia, was retained as consulting architect, and the contract drawings for the ward buildings and the nurses', corpsmen's and officer's quarters were prepared in his office. The contracts for the buildings and exterior services were awarded to John McShain, Inc., Philadelphia. The writer is officer in charge of construction at the site.

Fig. 9. Corpsmen's quarters illustrate use of large size precast panels to develop a distinctive over-all architectural pattern.



A 120x200-ft. main floor, flanked by two-story shops, with separate heating plant at right.

Hangar-Repair Shop for the Air Corps

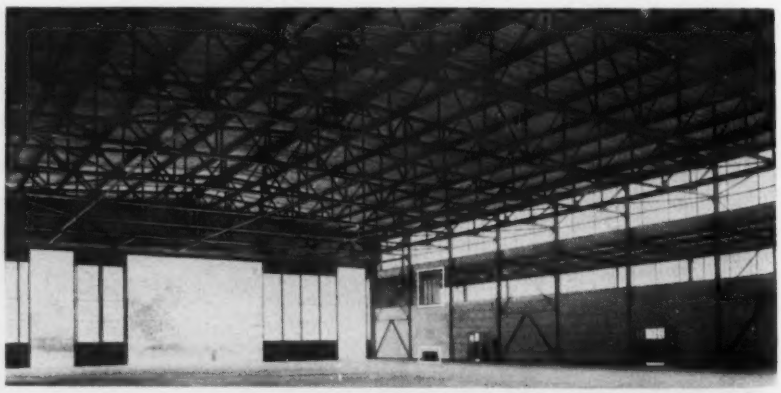
***Contents in Brief**—Standardized design for ease in erection and possible re-use feature structures being built by Corps of Engineers at many Army airfield locations. Building provides 120x200-ft. main floor and 16,000 sq. ft. of shop area along sides. Design suitable for adapting to more extensive airport use after the present emergency.*

DESIGNED FOR ECONOMY of fabrication, rapid erection, and possible re-use at another site, the "Standard Air Corps Hangar and Repair Building" now being built at a number of Army air fields by the Corps of Engineers represents a utility structure of importance in the present defense program and a building of wide potential use in the inevitable post-emergency aviation expansion. The building has a 120-ft. clear span, is about 200 ft. long (could be readily lengthened) and includes a 20-ft. width of two-story offices and shops along each side. As being built in the present program, the repair hangar unit includes a separate heating plant building.

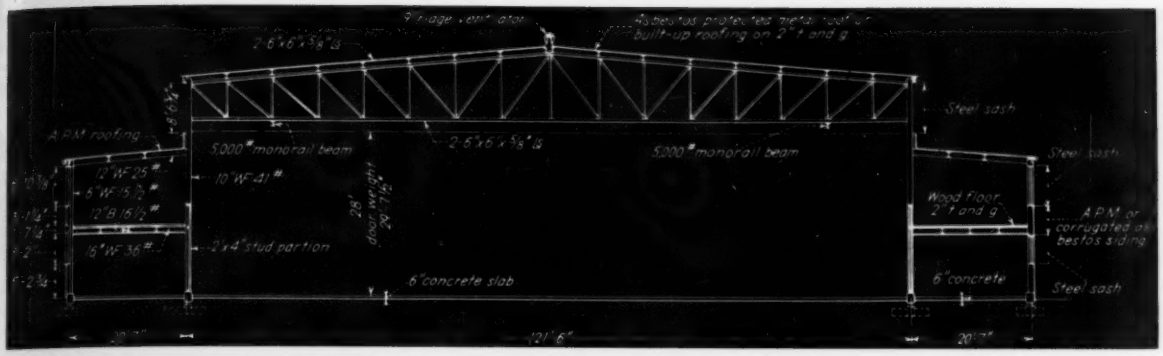
The standard "A. C. Hangar" is an essential element in the program for expanding ground and air field facilities to keep step with the increase in the Army air force. For flexible and effective air force operation, properly equipped fields are necessary at widely scattered locations, in addition to the more permanent large-scale air bases. The present plan for improvement of existing fields and construction of additional Army air fields has been carried forward during the past year in almost every section of the country. Much of the construction program has been related to runways and landing areas, but important supplemental work has included the erection of structures at these locations, which can be used for plane storage and minor repair and maintenance work. For this requirement the Air Corps has adopted a standard design in the interest of economy and construction speed. The Corps of Engineers, which was called in to supervise the construction program on the Army air fields, has been carrying out the erection of the buildings at a rapid rate in as many as twenty different locations.

Design requirements

The structure dictated by Air Corps needs includes a 120-ft. floor span with a 28-ft. vertical clearance. A column spacing of 20 ft. and eleven roof trusses provide the required length of 200 ft. for the building. Obvious economies to be secured by having adjacent shops and offices resulted in the arrangement which provides, by means of lean-tos along



Bolted roof trusses, corrugated metal walls and membrane roof on timber (alternate type has asbestos-protected metal) indicate the design for possible re-use. Lights have not been installed. The outlining in white shows the discharge and cold-air return of one of the four unit heaters used for the main hangar.



Cross-section indicating general dimensions and design features. All field connections of structural steel frame are bolted.

the sides of the main hangar, about 16,000 sq. ft. of shop and office floor area.

The day lighting is taken care of by an 8½-ft. band of steel window sash along the two sides above the lean-to roofs and a double band of sash on the outer walls of the lean-tos, together with extensive window areas on both end doors. For artificial lighting a combination of incandescent and mercury-vapor units are used over the main floor. The 750-watt incandescent units and 400-watt mercury vapor lights are suspended from the lower chord of the trusses at 20-ft. spaces in both directions. These lights are dropped about 1½ ft. below lower chord elevation, providing the 28-ft. required clearance. The corresponding lighting in the shop areas consists of 200-watt incandescent lights spaced at 10-ft. centers.

The end doors open for a clear width of 120 ft. 3 in., each door comprising five sliding sections which are manually operated.

Heating, with the complementary problem of insulation, required separate decisions depending on the geographical location of the field.

Structural design

Because of the number of identical units to be built there was definite economy to be achieved in simplified and standardized structural design. In fact, one of the contracts let for structural steel included at least twelve or more of these buildings, which were fabricated and shipped to the field locations in various parts of the country.

The roof trusses are of Warren type framing with a 6-ft. depth at the ends and a sloping upper chord providing an 11-ft. depth at the center. Panel lengths are 7 ft. 7⅛ in. The upper chord consists of pairs of 6x6x⅝-in. angles and the lower chord is identical, with the size of the angles reduced to $\frac{9}{16}$-in. metal near the outer ends. These trusses were shop fabricated into four panel units for shipment.

Trusses are supported on 36-ft. 19-in. WF 41-lb. columns.

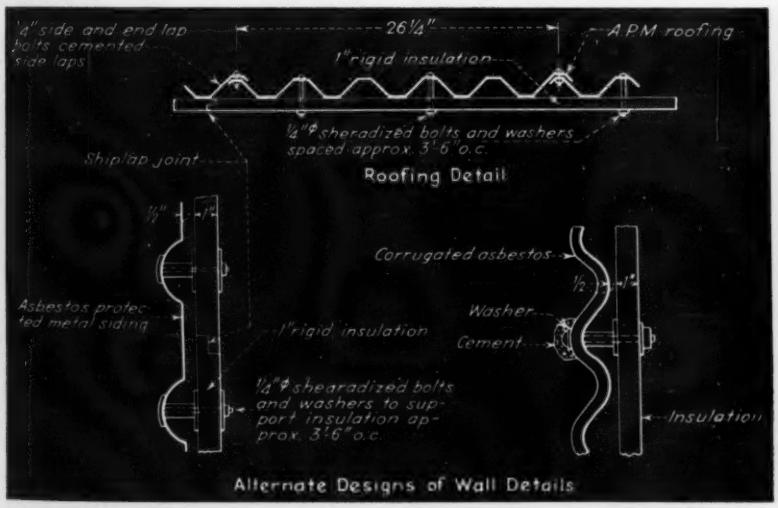
Framing of the shop section along the sides is equally simple. The outside columns are 6-in. WF 15½-lb. and the floor-beam system is indicated on the accompanying cross-section.

The roof over the trusses is supported on 10-in. I-beam purlins, topped by asbestos-protected metal. An alternative type of roofing consists of a 2-in. T.&G. timber deck, which is covered with a built-up membrane roofing. The same type of roofing is used on the lean-to sections as is used on the main building. As an indication of the standardization adopted for the design, the same type of T.&G. lumber used for the roof is used for the second floor of the shop area.

The ground floor throughout the entire structure consists of a 6-in. concrete slab reinforced with wire mesh (4x4-in. No. 6 gage). This concrete slab was poured directly on a 6-in. fill of selected material, in those locations where ground conditions did not provide unusual problems.

The standard building design provides for walls of asbestos-protected metal, such as is used for the roof. As an alternate, the walls may consist of corrugated asbestos siding.

Details of the types of wall design are indicated in the accompanying drawing.



Details of alternate designs for walls and typical roof.

Construction procedure

Construction procedure used in the erection of the hangar-repair shop building varies, of course, with local conditions in the field. The following description of construction methods and sequence relates specifically to the work carried out in building the structure at the Windsor Locks Air Field at Windsor Locks, Conn.

A small amount of grading work was followed by excavation for the four lines of column wall footings. The concrete footings were poured following usual procedure with truck-mixed concrete delivered from a

convenient commercial batching plant.

Structural steel was delivered at the site with the trusses in four-panel sections. One of the design requirements provides that all field connections in the structural steel frame are to be bolted to facilitate dismantling and moving of the building. The four sections of the trusses were assembled on the ground representing a total weight of about 8 tons. Bolts were all manually tightened with the exception of the gusset plate bolts on the lower chord, which were tightened with air wrenches because of the need for making up especially tight joints along the tension chord.

With the trusses assembled and the columns set in position, the trusses were raised by a pair of crawler cranes, the bolted connections to the columns completing the assembly. Erection of the structural steel frames, including all bolting, occupied 7 days.

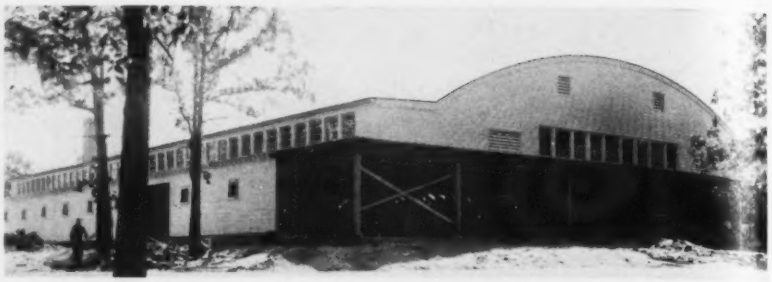
Because the framing is relatively light, and to secure stability during the setting of the trusses, the procedure included the setting of the lean-to columns and floorbeams connecting with the main column prior to the setting of the trusses.

Effectiveness of the bolted connections is indicated by the fact that the original camber of 1½ in. in the 120-ft. span did not diminish appreciably with the dead load in place. Placing of walls followed with corresponding installation of the steel sash.

The heating system, which is installed in a separate structure, located about 20 ft. from the hangar, includes two 15-lb. steam boilers. For heating the main hangar area, steam is delivered to four unit heaters located in the shop with outlets directed in the main room at an elevation of about 12 ft. off the floor. Each of these unit heaters has a cold air return at the floor elevation. Heaters are equipped with a 1½-hp. blower and the units are rated to handle 750 cfm. Smaller unit heaters attached to the ceiling are used in the smaller shops.

These airport improvements are being carried out under the direction of the Corps of Engineers, directed by Office of the Chief of Engineers in Washington, D. C., acting through the various divisions and district offices.

The Windsor Locks project is under the direction of the Providence, R. I., district; Lt. Col. Harley Latson was district engineer until his death Sept. 29. C. M. Hearn is resident engineer in charge of the project.



Designed for recreation, this structure will be used for sports or stage shows.

Sports Arenas for Army's Off Hours

***Contents in Brief**—Providing a clear floor of 100x180 ft. for sports and theatricals, buildings of a standard plan are being erected at 50 Army posts. Use of critical material considered in design. Lamella roof supported by reinforced-concrete buttresses.*

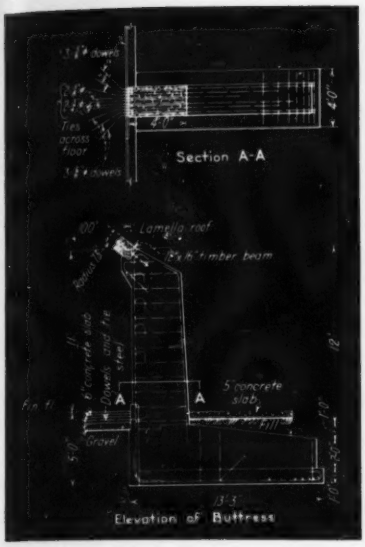
RECREATION FACILITIES at more than fifty of the Army posts are being augmented by the construction of "Sports Arenas" from a standard plan prepared in the engineering branch of the construction division of the Office of the Quartermaster General. Design of the 131x199-ft. structure, which provides a clear floor area of 100x180 ft., was made after intensive economic study taking into consideration the avoidance of the use of critical materials.

The buildings are of one-story frame construction, with relatively standard timber design. A lean-to along each side of the main structure provides space for two 15x19-ft. dressing rooms for contestants, with necessary toilet and shower room facilities, an office, post exchange refreshment room and a 15x85-ft. storeroom.

The recreational facilities planned for these structures feature basketball as the primary sport, with other use for softball, tennis, boxing, wrestling, and the presentation of shows and theatrical performances. For the theatricals a portable stage is provided, which contains the necessary curtains, drops and other paraphernalia required for the handling of fairly large productions. When used as an auditorium the seating capacity of the arena is about 3,500. These seats are portable and are readily removed when the arena floor is needed for sports. Incidentally, the basketball cages are arranged so that they can swing clear and do not provide obstructions for other uses of the building.

General requirements for the building involved only the one structural problem of providing an economical form of long-span roof. This particular design problem received extra study and consideration of materials available. Further, it was deemed expeditious to have two designs for the roof prepared, one for an all-wood design and the other using a minimum amount of steel in combination with timber. The result was the adoption of plans readily obtain-

Roof members are supported on a 12x16-in. horizontal timber, which is carried on concrete buttresses at 20-ft. spacing along the walls.



Details of concrete buttress, showing system of dowels and ties in floor slab.

able for an arch roof of the lamella type, and for a segmental steel arch, which were to be considered as alternates in the final plans for the structure to be erected at the different army posts. Either type of design was considered satisfactory in meeting requirements for the temporarv structures.

Both types of roof design were based on requirements in two distinct climatic zones. Both of these zones call for a lateral force of 20 lb. per sq.ft. of wind load, combined with a static live load of 40 lb. per sq.ft. for one zone and 30 lb. per sq.ft. for more temperate climates. Each of these live load requirements is to be modified in conjunction with the 20-lb. lateral load to satisfy a near maximum critical unbalanced load assumption.

Roof design details

The supporting system for the lamella type of roof presents an interesting structural detail. The 2x12-in. timber lamellas are assembled on a movable scaffold to fit a 73-ft. radius for the 100-ft. span. These timber units have a 4½-ft. horizontal spacing at the springing line, where they are supported on a 12x16-in. horizontal timber (see drawing), which transmits the thrust of the roof to reinforced-concrete buttresses at 20-ft. spacing. The timber stringer is bolted directly to the top of the buttresses.

These buttresses, which vary slightly in detail according to the different climatic zones, are 2 ft. wide and vary from 3 to 4 ft. in thickness in an 11-ft. height. A cantilever footing section extends about 13 ft. back of the vertical buttress, providing a 4x13-ft. bearing area on the soil, which is specified to have a 3,000-lb. per sq.ft. minimum supporting value. Reinforcing includes horizontal hoops and bent bars extending from the front face of the vertical section into the cantilever footing.

These buttresses are connected to the concrete floor slab by a system of reinforcing bars that include both dowels and tierods across the 100-ft. width of building. Three ⅝-in. round bars fan out in both directions from the buttress to act as dowels. Two ¾-in. round rods (four in the colder zone) extend entirely across the floor to the buttress on the opposite side. In elevation the horizontal footing of the buttress is below the grade of the concrete floor under the storage room and other lean-to areas.

The floor under the main arena is a 6-in. concrete slab, and all other slabs on the ground are 5 in. thick. Slabs are reinforced with 4x4-in. No. 6 gage wire mesh. The floors are finished with maple flooring on timber sleepers.

Above the elevation of the lean-tos extending along both sides, dormers are provided with fixed sash extending the entire length of both sides. The roof includes a 1-in. sheathing topped with built-up membrane. In the colder climatic zone the roof includes a ½-in. insulation board between the lamellas, supported about 3 in. below the sheathing.

Foundations will be designed to meet local ground conditions.

Toilet facilities, including two gang-showers for the use of the contestants and two for the public, are provided with conventional equipment corresponding to the commercial fixtures specified for cantonments. Specifications include definite provision against cross-connection between the water supply and the drainage system.

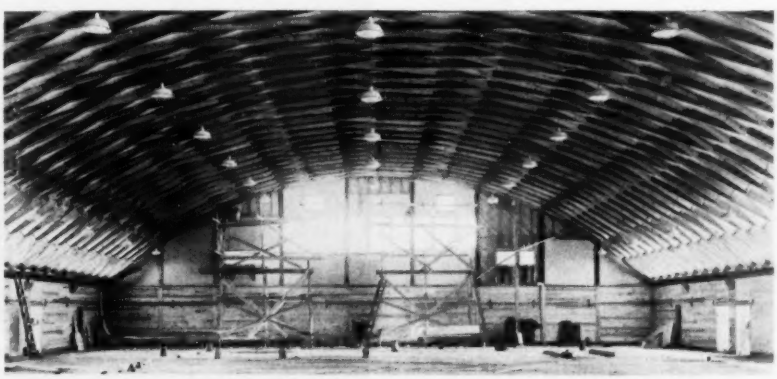
The heating system is a two-pipe gravity steam system with the boiler room located as an extension at the rear of the main building. All pipelines and heating units are located high along the walls of the main arena to maintain a maximum clear area above the floor. A special feature of this heating system is the use of the ventilating type of unit heaters with nozzles directing the heated air down toward the floor. By operation of manual dampers provided in these heater units, varying quantities of fresh air may be introduced, or the room air may be recirculated.

Ventilation is provided by two large propeller-type fans located high on each end wall of the building. These fans may be operated singly or together as required by the occupancy of the building.

Lighting is furnished by fixtures mounted 25 ft. above the floor capable of producing a 20-foot-candle level of illumination over the sports arena. Circuiting is arranged so that lights may be used on any one or all of the three basketball courts. A special group of five 1,500-watt concentrating type of prismatic glass reflectors are permanently mounted in the center of the arena.

The illustrations show a typical project under construction at Camp Robinson in Arkansas.

These sports arena buildings are being designed and built by the Quartermaster Corps, under the direction of Brig. Gen. Brehon B. Somerville, chief of the construction division. Col. W. D. Styer is deputy chief of the division.



A 100-ft.-span roof of 2x12-in. lamellas erected to a 73-ft. radius.

Semi-Permanent Design for Navy Mess Hall

Contents in Brief—Representative of a type of Bureau of Yards and Docks buildings, mess hall at Quonset Point Naval Air Station has concrete foundations and floors and steel frame, but timber walls and roof. Walls, however, are enclosed in brick veneer. Rigid-frame bents of 50-ft. span are features. Interior walls are glazed tile or plaster on wood or metal lath furring. Suspended acoustical ceilings are used.

BUILDING CONSTRUCTION at the Navy's many shore establishments ranges from the heaviest permanent type structures to the lightest of temporary shelters, but among the many designs none is more interesting than a so-called semi-permanent type used at the new Naval Air Station at Quonset Point, R. I. Of steel frame with concrete foundations and floors, the buildings have timber roofs and timber sheathed walls, the latter combined with double hung metal windows and covered with brick veneer on the outside and plaster or tile inside. Economical in first cost and maintenance charges, such buildings also yielded to rapid design and construction.

The largest and most interesting of the several Quonset structures is the mess hall for the enlisted men. Of some 45,000 sq.ft. area, the building has its large dining room arranged in a U-shape, 300 ft. across and 150 ft. deep, around the kitchen and cafeteria facilities, which connect to a 75x125-ft. bakery and food storage wing that extends out between the legs of the U. The relative locations of these various facilities are shown in Fig. 1, which also emphasizes another distinguishing characteristic of the building, namely, its enveloping corridors. These corridors, which surround the three sides of the mess hall to about half its height, are merely continuations of closed passageways that join the mess hall to the rows of barracks that are located on either side of it. From bunk to mess is thus always a dry trip; frequent doors between the corridors and the mess hall aid in the orderly movement in and out of the squads of enlisted men who get their food at cafeteria counters, eat it at tables, and return their own dishes to the convenient sculleries.

All of the semi-permanent buildings have simple foundations consisting of poured exterior walls and separate interior piers which raise the floor about 3 ft. above grade or just enough to provide ventilation and to permit access for inspection or repairs. Except that a full basement is used under the storage and bakery wing, the mess hall foundations follow this pattern. The piers are on 25-ft. centers parallel to the front of the building but on shorter spacing (16 to 18 ft.) in the other direction. Footings were excavated to a material that would give a bearing value of 6,000 lb. per sq. ft., and usually this depth was about 4 ft. below grade. In addition to foundation walls and piers, underfloor construction involved a system of utility trenches that occupy space beneath the exterior corridors and extend around the rear walls of the dining halls to the kitchen and cafeteria area.

The steel framing of the mess hall building is special in some of its details, although the layout is simple and uniform. Main floorbeams span 25 ft. between foundation piers and are parallel to exterior walls, fill-in beams, spaced 5 ft. apart, run normal to the exterior walls on the shorter span. Columns are rolled I-sections arranged in 25-ft. square panels except in the dining halls, where a 50-ft. transverse spacing prevails. Conventional beam and girder framing supports the roof.

Principal interest in the framing centers in the 50-ft.-span bents of the dining halls. Spaced 25 ft. apart longitudinally, rising 20 ft. above the floor and furred out with boxing

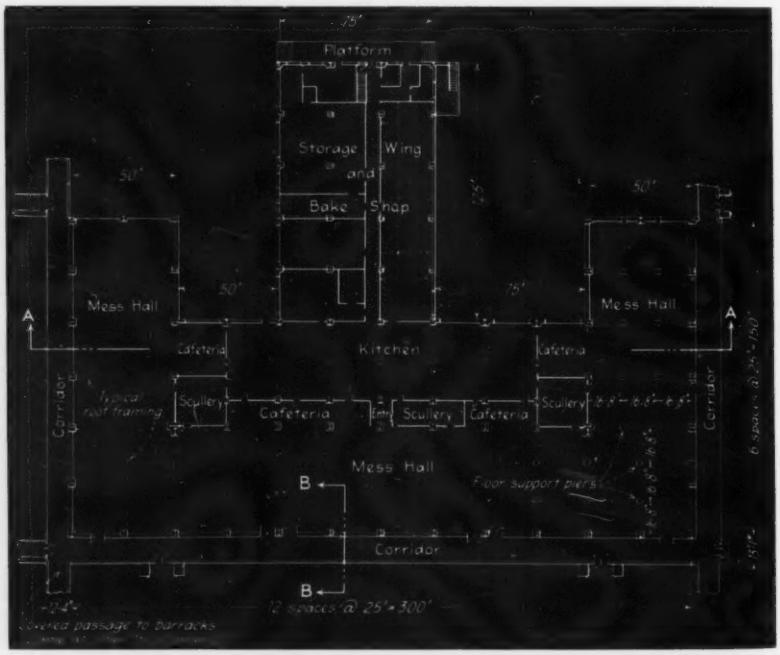


Fig. 1. Floor plan of Quonset mess hall shows how dining areas surround the kitchen and service facilities. Exterior corridors connect with barracks. Section AA is on Fig. 4 and section BB on Fig. 3.

and plaster to relatively massive section, the bents furnish an agreeable appearance of solidity to the room. Legs of most of the bents are 14-in. 78-lb. H's, while rafters are 24 or 27-in. I's. Deep haunches at the leg-rafter connections impart a semi-rigid frame action to the bents, tending to reduce the center moments. These haunches were designed as shop-welded assemblies of flat plates but the fabricator obtained permission to change to a riveted plate-and-angle detail. Fig. 3 shows the haunch detail as designed and also the special one that occurs at two points where bents join at right angles. In the latter instance a double column is utilized with a haunch connection on each column.

Floors are concrete slabs 3 in. thick, except in the storage wing where a 4-in. thickness is used. Interesting design and construction characterized the slabs in the areas where there are no basements. Here the concrete slabs are poured on 2-in. compressed slabs of cemented wood fibers to insulate the floor from cold and moisture. The forms that supported this floor during construction were left in as a further protection since it was cheaper to leave them in than to remove them. They consisted of 1x6-in. plank panels supported on 2x4's spaced 2 ft. apart and blocked up from the lower flanges of the floorbeams, the planks being placed at just the right elevation to permit the 2-in. slabs of insulation to be forced in beneath the top flanges of the beams. Before the concrete slab was poured, 10*d* nails were angled at random into the insulation to dowel the insulation to the concrete.

Floor finishes vary in different parts of the building. In the mess halls and cafeterias a ground finish in 4-ft. squares prevails, while a quarry tile surface is used in the kitchen and sculleries. The bake-shop also uses quarry tile, while elsewhere in the storage wing and also in the corridors a simple cement finish suffices.

Despite its extensive use of steel, concrete and brick, the mess hall contains a vast amount of timber framing in its walls and roofs, not only as studs and sheathing but as furring around columns and as supports for suspended ceilings. All lumber used was treated at the mill with a clear chemical preservative.

Fig. 2. When mess hall construction was at its peak. Timber roof is in place and wall studs are being installed. The 50-ft.-span steel rigid frames will be furred out and enclosed in metal lath and plaster.

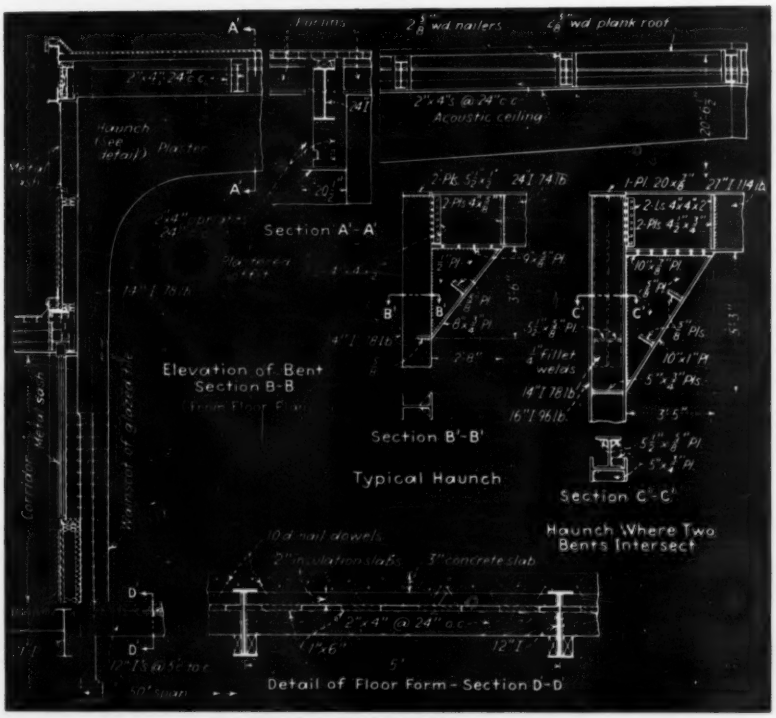


Fig. 3. Details of mess hall framing and floor. The welded haunch design was later changed to riveting. Forms for the insulated floor were left in place.

Wall and roof details are shown in Fig. 4. Exterior corridor walls are solid brick up to 3 ft. above the floor, and then consist of double hung window sash to the underside of the corridor roof. In effect these walls form the enclosure of the lower half of the building. The outside walls of the mess hall, which in their lower half are the inside walls of the corridors and made up largely of windows, consist of studs on 5-ft. spacing, sheathed on the outside with lumber and on the inside with wire lath or plaster board. The outside sheathing is covered with building paper and then enclosed in brick veneer separated from the sheathing by a $\frac{3}{4}$-in. air space. Inside, the wire lath is covered with one coat of plaster to serve as backing for ceramic glazed tile, which is used as a 7-ft.-

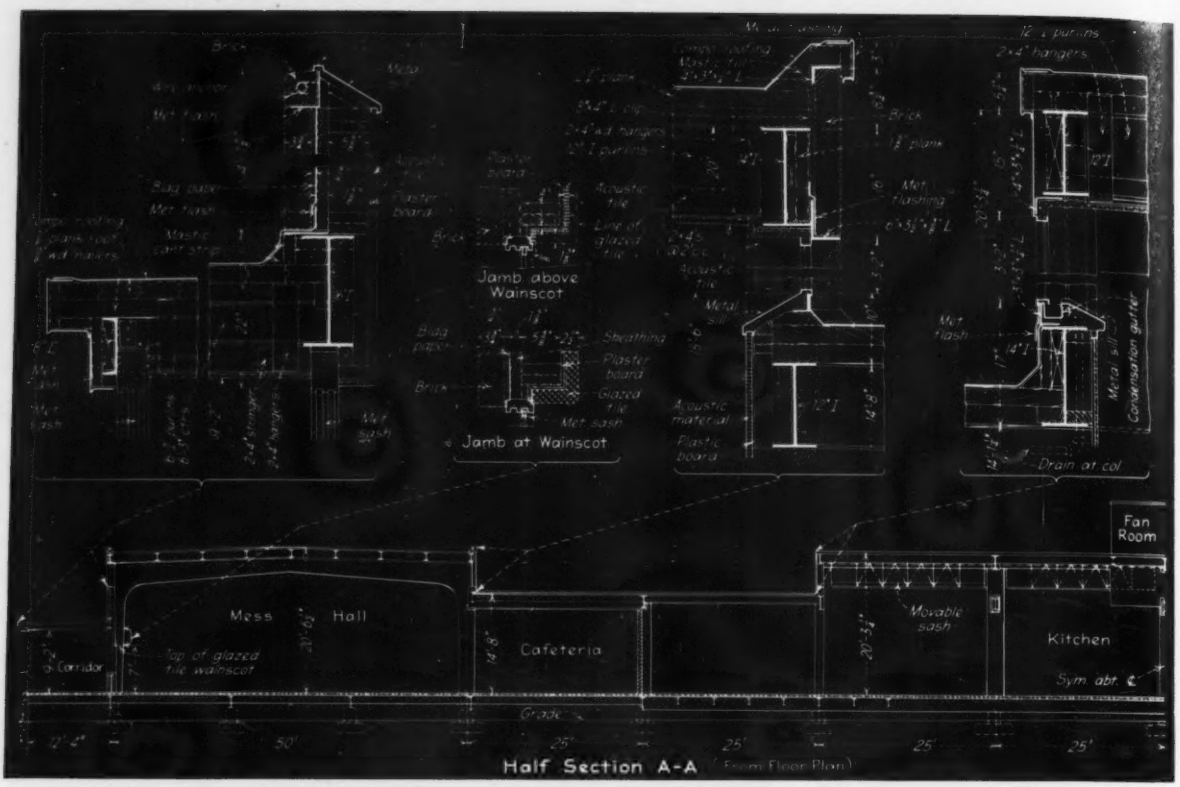


Fig. 4. Wall and roof framing of Quonset mess hall illustrates interesting combination of a large variety of materials.

high wainscot. Above this, where plasterboard is used, the finish is three coats of acoustic plaster. Strips of wire lath were used over the plasterboard at all window and door joints to reduce the possibility of cracks. In addition to the solid elements of this wall, a 6-ft.-deep line of double hung windows is used between the mess hall and the corridor, and a 3-ft.-deep line of fixed windows just below the roof.

Timber is also used in the interior partitions and for furring the columns of the mess hall bents, this furring being covered with tile and plaster the same as the walls. Partitions are of various types. While the kitchen walls are similar to those in the mess hall, in that they have a ceramic glazed tile wainscot, the scullery walls utilize these tile units from floor to ceiling. In the storage wing many of the partitions are filled with cork insulation.

A single design of roof is used throughout the building. Steel purlins on 5-ft. centers, with $2\frac{3}{8}$-in. nailer strips on their top flanges carry the $2\frac{3}{8}$in. timber decking, which is covered with composition roof. In combination with this topside covering, the purlins are also enclosed in suspended ceilings, mostly of acoustical fiberboard. These ceilings are attached to 2x4 stringers or joists suspended on 24-in. centers from 2x4 hangers, which are attached at their upper ends to the nailer strips on the purlins. Essentially this same system of support is used to furr out the 24-in. steel rafters of the mess hall bents to a rectangular section of nearly twice that depth (see Fig. 4).

The mess hall and other similar buildings at the Quonset Point Naval Air Station were designed for the Bureau of Yards and Docks by Albert Kahn Associated Architects and Engineers, Inc., of Detroit. The officer in charge of construction is Comdr. R. V. Miller (CEC) USN, and Rear Admiral Ben Moreell (CEC) USN, is chief, Bureau of Yards and Docks.

Fig. 5. Interior of a barracks building at Quonset utilizes same glazed tile wainscot with plaster above that characterizes the mess hall.

Welded Rigid Frames for Navy Shop

***Contents in Brief**—Bents of three 100-ft. spans are main structural elements of a shipfitters shop. Center bay carries a second story on 72-in. plate girders. Roof of this second floor designed as an independent two-hinged arch. Foundations are on piles so that fixity of column bases was avoided as far as possible. Lean-tos contribute stiffness to outside columns.*

A SHIPFITTERS SHOP recently completed at one of the Navy shore establishments represents industrial building design in many of its most modern aspects. Particularly is this true of the steelwork, which is made up of rigid frame construction and is fabricated by arc welding. Each rigid frame bent is composed of three 100-ft. spans or bays, of which the center bay is two stories high to accommodate a mold loft. This arrangement (Fig. 1), plus the necessary provisions for both overhead and wall cranes in each bay, had special influence on the design. Notable features include heavy laced columns for the center bay, 100-ft.-span 72-in. plate girders to carry the mold loft, pinned shoes for the columns of the center bay, and the use of frame haunches that extend above rather than below the rafters. Ingenious use was also made of lean-tos along the sides of the building to impart stiffness to the tall, slender columns.

The use of structural welding by the Navy's Bureau of Yards and Docks is not a new departure although its application to principal stress members has accelerated during the past three years. As early as 1933, welding was used on the floor plates of the Sunnyvale airship hangar, the machinery bases of hammerhead cranes at Bremerton, and the bracing and roof framing of a telescope building at the Naval Observatory in Washington, D. C. Welding was permitted on bridge cranes shortly thereafter, followed by its utilization for piping, underground gasoline tanks and H-pile piers. In 1939, 75-ft.-span welded rigid frame bents were used in the remodeled mess hall at the Naval Academy at Annapolis, and about the same time the first welded rigid frame shop building was begun. This latter structure, and several others like it, furnished the antecedents for the design of the shipfitters shop described in this article.

Saving in steel

Fundamentally the selection of the rigid frame design for the shipfitters shop was predicated on the necessity for saving as much steel as possible. By applying a rigid frame design, it was possible to use 24 and 27-in. I-sections for spans of 100 ft. where otherwise a truss of approximately 10-ft. depth would have been required. Additional advantages achieved with such a design were: maximum interior headroom for a given roof height, and a neat and clean-cut appearance architecturally. Deciding on a rigid frame design, it was only logical to make use of arc welding, which permitted an additional saving of steel and facilitated the details of the frame corners.

The building, 552 ft. long, consists basically of three 100-ft. bays with a 25-ft. lean-to on each side. However, for a length of about 250 ft. only two 100-ft. bays are erected at the present time. Also for several bays on each side the lean-to is omitted, a fact which necessitated special provisions in the structural arrangement, as described below.

The main outside bays have a clear height of 57 ft. 6 in. in the center. In the middle bay a mold loft floor 53 ft. above the first floor is provided, the roof over this floor rising to 77 ft. 6 in. above the first floor. The lean-to is only 22 ft. high, but contains two stories, the first being used for storage and office space, the second for locker and wash rooms. All bents are spaced 23 ft. apart.

The principal rigidity of the building is formed by the heavy and stiff middle frame, consisting of two laced columns and a welded 72-in.-deep plate girder, which constitutes the main support of the mold loft floor. Rigidly connected with this main bent are the two 100-ft. side frames, the stiff connection being achieved by haunching down the welded plate girder to the depth of the adjacent 27-in. roof beams. The outside columns of the side bents are also rigidly connected to the roof beam by means of substantial haunches. It may be noted that in both cases the haunches are

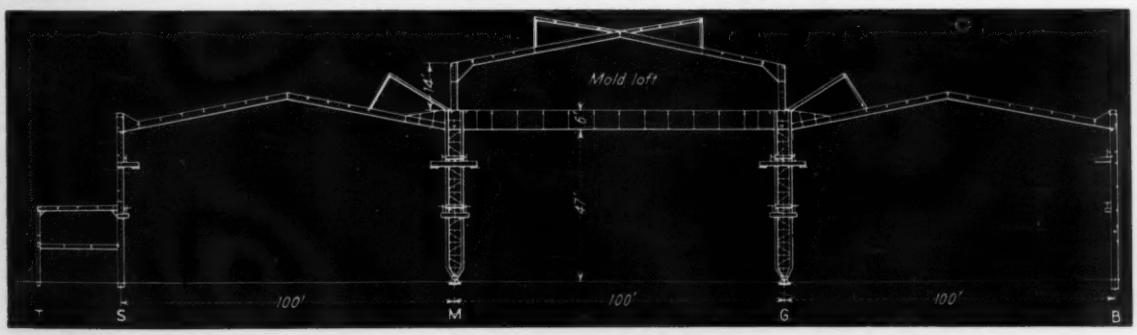


Fig. 1. Elevation of shop bent designed as a three-span rigid frame. Mold loft roof was considered as an independent two-hinged arch.

turned up, thus providing the necessary clearance for overhead crane without increasing the roof height.

As the soil conditions required the use of pile foundations, special efforts were taken to avoid fixed column bases. In line with this objective the laced middle columns were set on 4-in. pin bearings. For the main outside columns, where the horizontal and vertical reactions are much smaller, base plates with anchor bolts were provided. However, this simple and inexpensive arrangement was possible only where the adjacent lean-to served as a stiffening member for the slender outside columns. Where the lean-to was omitted, these columns, 55 ft. high and only 30 in. wide, had to be fixed at the base to secure the necessary stiffness. The magnitude of the lateral forces on this base can be seen from the fact that it had to be designed for a moment of 831 kip-ft. This explains also why the lean-to was rigidly connected to the main structure. By such connections it not only was possible to avoid a heavier outside column with a more expensive base but it also permitted the use of a 6-pile footing with a mat of only $5\frac{1}{2}$ x $8\frac{1}{2}$ ft. for the columns at the lean-to whereas the fixed base columns required an 8-pile footing with a 10 x 13-ft. concrete mat.

The building was designed for a roof dead load of 25 lb. per sq.ft. (composite roofing over 2-in. plank) and a roof live load of 15 lb. per sq.ft. The mold loft (3-in. plank on steel beams) was designed for 85 lb. per sq.ft. live load, and the second floor in the lean-to for 75 lb. per sq.ft. live load. In addition, provision was made for two 15-ton overhead cranes in each bay and for 5-ton wall cranes cantilevering 15 ft. along all column lines. A wind pressure of 20 lb. per sq.ft. was assumed.

A very accurate analysis of the influence of these different loadings at all critical points of the frame was made, and the members were designed so as to have sufficient strength to carry four cranes in the most unfavorable position in one cross-bent, in addition to the other dead and live load. The magnitude of the occurring moments can be seen from the fact that the top of the laced columns is designed for a maximum negative moment of 2,589,000 ft.-lb., and the center of the welded plate girder for 1,695,000 ft.-lb.

Since about half of the structure will have only two 100-ft. bays initially, it was decided to proportion the members of all bents according to the moments for a two-span arrangement as shown in Fig. 3. Where three 100-ft. bays occur, the moments will be slightly less, and in this part of the building an additional 5 to 7-percent safety margin exists. In Fig. 3 the dotted frame over the mold loft was treated as an independent two-hinged arch. Scheme A (for the parts where a lean-to is used) has six statically

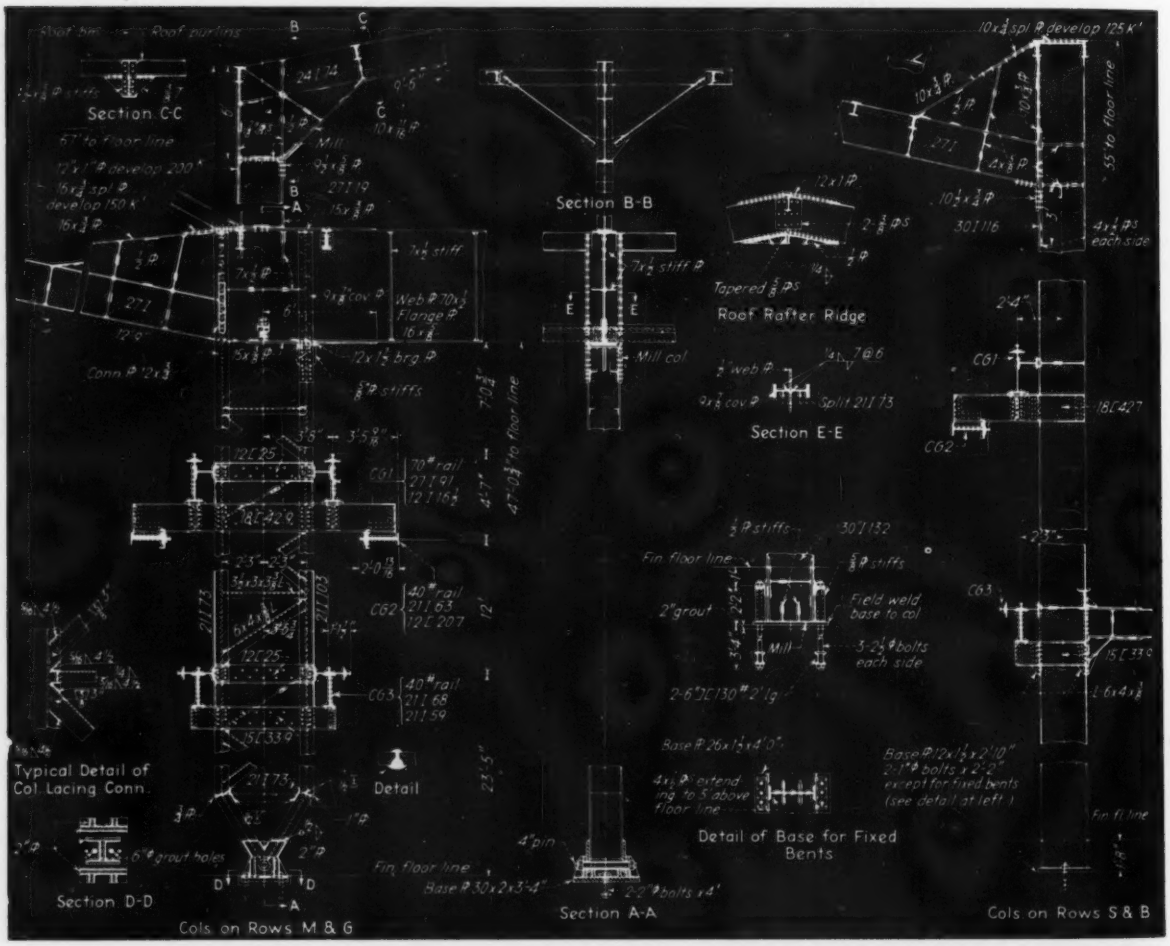


Fig. 2. Structural details of rigid frame bents in Navy shipfitters shop. Particularly noteworthy are the haunches, which are turned up instead of downward as is the more usual practice.

redundant unknowns, Scheme B (without lean-to) four unknowns. However, by means of a proper arrangement, it was possible in both cases to use only three equations with three unknowns to solve the system. This was achieved for Scheme A in the following manner:

(1) The system was computed as if there were hinges at points 1, 2, and 3, and all moments for all loading conditions as well as the angular change of angle 1, 2 and 3 were determined for this system.

(2) Points 1, 2 and 3, actually being rigid connections not permitting any angular change, moments M_1, M_2 and M_3 were determined so as to bring the angular change at these points to zero.

A similar consideration was made for Scheme B, thus enabling the designer in both cases to solve the problem with only three equations with three unknowns. The properties for the two-hinged arch under the mold loft and for the lean-to were taken from Kleinlogel's book *Rahmenformeln*. In the calculations for Scheme A, the so-called classical method of frame design proved superior to the moment distribution method of Hardy Cross which would have required four equations with four unknowns, sidesway being of vital influence on the determination of moments due to crane and wind loads. Scheme B, figured by the Hardy Cross method, results in only two equations, and the moment distribution method was therefore used in this case to check the results of the above described design.

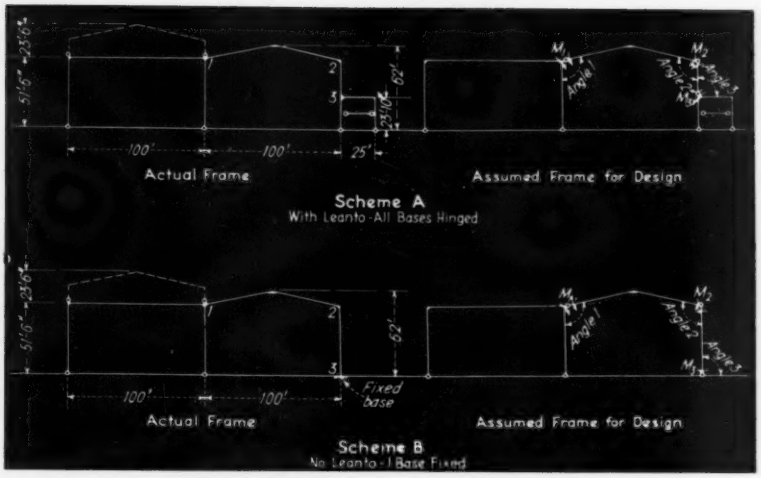


Fig. 3. Diagrams of two design conditions considered. Where lean-to was not used, outside column bases had to be fixed. Rigid frames were designed by assuming hinges and then determining moments for zero angular change at the hinge points.

The structural details of the rigid frame are given in Fig. 2. It will be noted that all field connections are riveted instead of welded, an expedient that conditions at the site made desirable. Attention may be called to the fact that no tierods were used, the pile footings being designed strong enough to take the full horizontal thrust at each base. As an additional factor of safety, a sufficient number of dowels between mat and floor were provided so as to transfer the thrust into the floor slab, which thus serves as an emergency tie.

The building was designed by Albert Kahn Associated Architects and Engineers, Inc., Detroit, in accordance with the general provisions as given in the bureau's standards of design for structural steel No. 12Y, supplement No. 1—standards of design for welded structural steel. Rear Admiral Ben Moreell is chief of the Bureau of Yards and Docks.

Hollow Concrete Girders for National Guard Airplane Hangar

Hollow box girders providing a clear span of 140 ft., with a 6 ft. 8 in. total roof depth, are the notable design features of the National Guard Air Corps Army and Hangar at Des Moines, Iowa. The structure consists of two of these 140-ft. span areas, each 100 ft. deep, with a central space for offices and shops, and a lean-to addition for storage along both outside walls.

The box girders of rigid frame design were selected to meet requirements of a relatively flat and shallow roof, a nearly horizontal soffit at the main door and a relatively wide spacing between supporting frames. Dimensions of the girder at mid-span include 7-in. thickness of side walls and top, with an 8-in. depth of bottom slab. The girder and leg width is constant at 7 ft. Between the girders 125 ft. c. to c.) are 7½x12-in. beams at ft. 8 in. spacing supporting a 3-in. roof slab. The hollow legs are 7 ft. 4 in. thick at the corner with 10-in. walls and middle web. At floor level the legs are 4 ft. 6 in. thick with the same 10-in. walls and web. Height from floor to roof is 37 ft. and the outside dimension of the rigid frames is 151 ft.

The structure was designed in the office of William N. Nielson, architect and engineer, Des Moines, Iowa, with detail structural designs prepared by Les Forsyth. Harold L. Tillson is WPA area engineer on the project.

Home of the Social Security Board now occupied by OPM and other defense agencies.

Functional Design for an Office Building

***Contents in Brief**—To house the offices of the Social Security Board a 341x547-ft. building was carefully designed to meet functional needs, and then rushed to completion for the OPM and other defense agencies. Column spacing and girder framing were influenced by air conditioning requirements. Vacuum process was used for dewatering slab concrete. Air conditioning installation is of record size for type of structure.*

RUSHED TO COMPLETION for housing the offices of OPM and associated agencies during the national defense period, but carefully designed as the permanent home of the Social Security Board, the new building named for the latter agency combines interest in the construction speed developed and the functional arrangement of its layout. Size of the structure is indicated by its ground dimensions of 341 x 547 ft. and its cubage of about 15,708,000, contained in five stories, combined with the fact that it is designed to accommodate a population of 6,964 people. It is typical of the newer design of permanent office structures being designed and built by the Public Buildings Administration of the Federal Works Agency for housing government organizations in the national capital. A review of this modern structure indicates current trends in federal office building design.

Designed for a purpose

Commercial office buildings are usually laid out for general occupancy and subsequently subdivided and partitioned off to suit the needs of individual tenants. The Social Security Board Building was designed to meet the specific office requirements of an organization which presented general specifications that included: (1) total space required, (2) population demand for services and facilities, (3) working space designed for specific functions, (4) live loads for extensive files, (5) efficient routing of work and (6) effective operating of office machinery. Further, the building had to conform to the requirements of various planning agencies of the national capital, which dictated the maximum 5-story height and the setback penthouse.

Occupying the area between 3rd and 4th streets and "C" Street and Independence Ave., the Social Security Building was planned as part of a double unit to include the Railroad Retirement Board Building located across "C" Street, which was improved and widened. This general location is being developed as one of the newer areas for federal office structures in Washington. Delivery access to the two buildings is provided by a joint ramp to a loading platform below grade and under the street which extends between the buildings.

The principal requirement for floorspace in the building included extensive storage facilities for the voluminous card and other files, and large open areas for office machine operations. These major area requirements are supplemented by office space for executives and the normal service facilities of a building to have a population of 7,000. Files required design for a 300-lb.per sq. ft. live load but this was confined mainly to the first and second floors. Office working areas for punching and sorting machines and trucking of loads of cards were desired to promote efficiency, which eliminated the amount of partitions normally included in a building of this kind. The girder lengths originally planned to provide these clear spans were modified, as described later, in the interests of design and construction economy.

Size of the structure required courts for effective day lighting, and the four interior courts and the four open-end courts are indicated on the accompanying plan. Arrangement of these openings left a wide space extending lengthwise of the building, which was utilized most effectively to include all of the services and utilities. A central corridor and two flanking the court openings provided access to this service area on each floor. This floor arrangement was carried up to the fifth (top) and the

penthouse was placed directly above to house all air-conditioning equipment.

Heaviest building traffic will occur between the first and third floors and escalators are installed to handle this service with provision for extending them to the fourth floor when necessary to expand the heavy work and general office space.

The fifth floor contains the executive staff offices of the board.

Other requirements to be considered in the structural design included a complete air conditioning system with operating machinery in the penthouse and ground floor, extensive use of acoustical ceiling material in order to reduce the noise of office machinery in large open areas, and a heating system supplied with steam from the central plant of the federal government through a tunnel into the ground floor.

Structural design

In general the structure is of relatively standard reinforced-concrete design, using concrete joist floors with a 2½-in. structural slab topped by 4½-in. concrete fill for embedding of conduits. An exception to this typical floor design is at ground level where possibility of high water seepage made special precaution necessary. On this floor the bottom 3-in. slab, laid on the ground, is covered with a layer of 2-in. split title, which drains to sumps. This tile, which is covered with a layer of copper and fiber-reinforced paper, supports the second concrete slab 3½ in. thick, with the top of slab 2½ in. below the finished floor to allow for proper finish.

The building has concrete skeleton exterior walls with a 6-in. stone facing backed with brick and concrete.

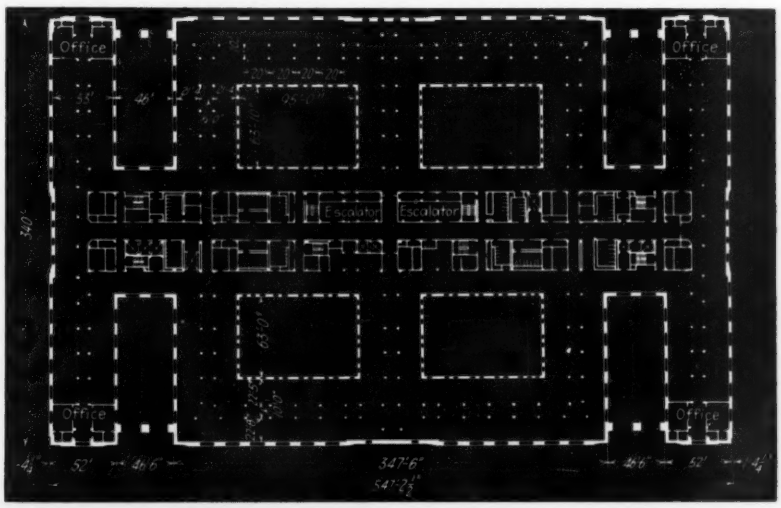
Column spacing, as desired for the areas of open floor, required girders of undesirable depth. Further, this framing design would have provided no space for air conditioning ducts, which would have been unsightly obstructions along the ceiling. A satisfactory compromise design was obtained, which reduced girders to a reasonable depth and at the same time provided advantageous space for the air ducts. In place of a column at mid-span, which would have been a serious problem if a corridor was desired at some future use of the building, two columns at 8½-ft. clear spacing were introduced, leaving side spans of approximately 21 ft. on either side. This column arrangement and the extent to which it was used on the large floor areas are indicated in the accompanying plan drawing. Girder depths on the side spans were usually 20 in. with the suspended ceiling established at this level. In the short center span, the girder was carried through as a thick slab 12½ in. deep, the ceiling of this span being lowered as necessary to provide space for the main ducts. Incidentally, this double row of columns provided floor space that can be effectively used for filing cases.

Design of the structural members involved usual practice. An interesting design detail that was developed on this building was the method of attaching the relieving shelf angles for supporting the limestone facing. Details of this method are shown in the accompanying drawing.

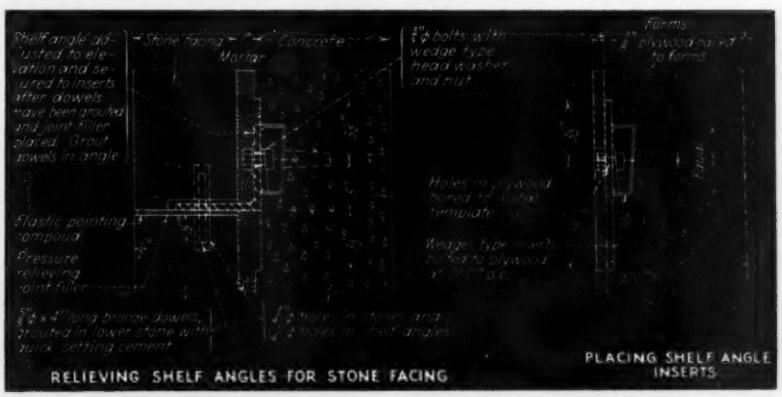
In accordance with architectural requirements for the group of buildings, the exterior walls are faced with 6 and 8 in. of shot sawn limestone having a buff or rustic color, and the walls in the courts are faced with large size (12½-in.) standard width and thickness brick of light buff color.

The roof consists of flat composition roof covering over 1-in.-thick insulation board laid on the concrete slab. Copper and lead-coated copper flashings are used. The entire roof over first story in the courts forms a skylight composed of small concrete ribs forming a checker pattern in which is set ½-in. thick heat-absorbing glass on the exterior side and dull-finished diffusing glass on the underside, with a 4-in. airspace between. Additional cooling is provided here by concealed air conditioning ducts with outlets at the sides of the skylights.

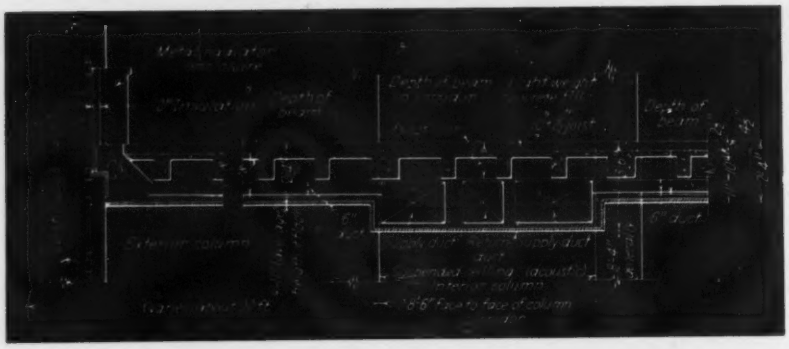
Foundation material varied from a



General arrangement of typical floor indicating the system of double, interior columns used. Note the large, open working areas, and the concentrating of all services and facilities in the central area, which was located under the penthouse containing the air conditioning equipment.


Shelf angle adjusted to elevation and secured to inserts after dowels have been grouted and joint filler placed. Grout dowels in angle
Stone facing
Mortar
Concrete
¾" ϕ bolts with wedge type head washer and nut
Forms
¾" plywood paint to forms
Elastic pointing compound
Pressure relieving joint filler
Holes in plywood spaced to template
Wedge type inserts bolted to plywood at 24" o.c.
RELIEVING SHELF ANGLES FOR STONE FACING
PLACING SHELF ANGLE INSERTS

Details and method of placing relieving shelf angle for supporting stone facing.



Section through typical floor showing double columns, arrangement of beams to facilitate handling of air ducts, location of conditioning units, and design of floor system.

hard cemented gravel, which provided adequate support for the design loading of 2 tons per sq. ft. on the spread footings, to a soft, black material in an old creek bed, that crossed a corner of the site. This material had to be removed, and irregularities in the underlying strata, shown to exist by the exploratory borings, required that the footing design within the transition areas between sections where piles were required and where spread footings were suitable, be developed on the site based on conditions disclosed by actual excavation work.

Within an area that represented about 15 percent of the entire building site, pile foundations were used with lengths of piles varying from 12 to 28 ft. Over other sections of the site where the good foundation material lay at a depth lower than normal footing design, excavations were carried down within timber sheathing and these excavations backfilled with lean concrete up to footing level without removal of the lagging.

Construction speed

About the time that construction work began on the Social Security Building, need for additional office space in Washington became acute and the construction schedule on the structure was advanced at record speed to provide accommodations for the newly established organization of the OPM.

General construction operations followed relatively standard procedure, the chief distinction being the extensive use of the vacuum process for removing excess water from the concrete slabs, in order to speed curing and form removal. This procedure was used on all of the floor slabs representing an aggregate area of more than 750,000 sq. ft.

The procedure involved the pouring of the concrete slab by usual methods followed by screeding off to rough grade in preparation for the removal of excess water. As placed, the concrete had a water-cement ratio of approximately 7 to 7½ gal. of water per bag of cement and a slump of about 6 in.

The vacuum pads were then placed on the screeded surface covering a total area of about 80 sq. ft. The suction was then applied for about 1 min. per inch of slab thickness, after which the pads were moved forward to a new position. Immediately behind the pads the concrete was sufficiently hard to permit men to walk on the surface, but was in proper condition for final finishing. Standard portland cement was used for this construction.

Following these operations the forms were stripped in accordance with the following schedule:

Columns	48 hours
Joist	4 days
Girders	4 days
Final girder supports	4 days

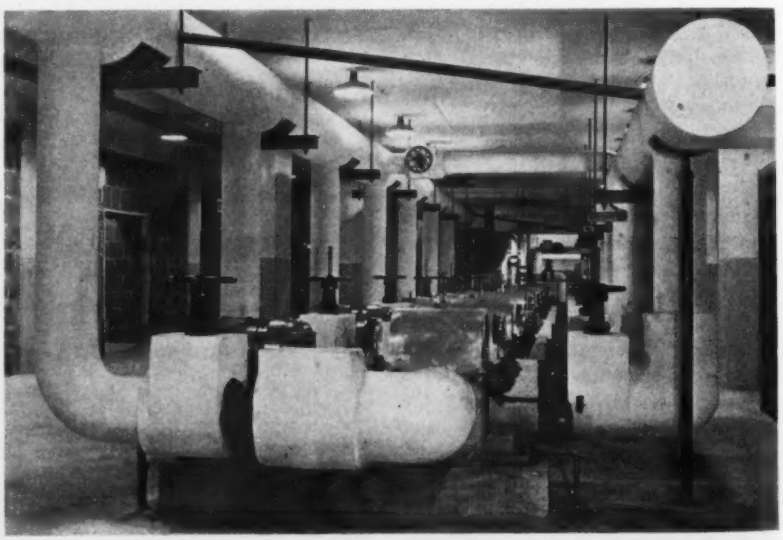
Tests indicate that the concrete reached an average strength of about 1,400 lb. per sq. in. in 72 hours, and averaged about 2,500 lb. per sq.in. at the end of the standard seven-day test as compared to its designed strength of 2,500 lb. at 28 days.

Following behind slab construction, the piping and conduits were installed to be covered with a 4½ in. thickness of lean-mix stone concrete, which was finished to a smoothness adequate for the direct application of linoleum floor covering.

Air conditioning

The complete air conditioning system for the Social Security Board Building and its companion structure is the largest on record for any office building. Its capacity totals 4,200 tons and includes seven 600-ton machines located in the basement of the Social Security Building. Chilled water from these units is circulated through coolers and dehumidifiers in a closed circuit by means of seven 1,100-gpm. pumps operated in parallel. This air conditioning system required 7,500 connected horsepower, and of this total 2,900 hp. is required for refrigeration.

Condensing water is cooled by means of air washers located in the penthouse and is then recirculated through the condensers. Almost



Chilled water pump grouping for the air conditioning system, which affected the structural design in providing for ducts under the corridor floorbeams.

1,500,000 cfm. of air is required to cool this water from 100 to 90 deg. A total of 87 dehumidifying and cooling units is required in the two buildings to supply 1,314,759 cfm. of air to the conditioned space.

The conditioned air is supplied to the rooms from units located under windows and fed from ducts sealed in the hung ceiling below. This system, which mixes the primary conditioned air with recirculated air within the unit, discharging vertically to the ceiling of the room, is considered a most effective means of applying the conditioned air. It permits a high temperature differential of as much as 25 deg., under control by local thermostat, which permits cost savings in fans, motors, and duct installation.

In the design of the air conditioning system comprehensive studies were made to determine the sunshine on different sections of the wall areas, including courts, during different months of the year and hours of the day. These elaborate studies resulted in arranging the proper volume of conditioning for the different zones.

Evaporative cooling is used whenever possible but some refrigeration is required in April, May, September and November. Refrigeration is required in continuous operation during the months of June, July and August.

Organization

The Public Buildings Administration, which is a division of the Federal Works Agency, is under the direction of W. E. Reynolds, with L. A. Simon supervising architect, and Neal A. Nelick supervising engineer. W. G. Noll is chief of architecture. R. W. Bristol was in direct charge of the architectural work on the project. Charles Z. Klander, prominent consulting architect from Philadelphia, designed the exterior of the building. T. C. Brooks is chief of structural engineering.

Field operations were carried out under the direction of construction engineer Joshua T. Davis.

The general contract was carried out by McCloskey & Co. of Philadelphia, with Nelson Tallman general superintendent.

Work on Aviation Instruments Calls for Building of Unusual Design

***Contents in Brief**—Buildings of an unusual type to be built at Army air fields of major importance have been designed to provide ideal conditions, as nearly as may be, for precise adjustment of aviation instruments. Features: no windows, heavy insulation throughout, door openings in series as in air locks, emphasis on air conditioning and longitudinal separation into two bays by a concrete wall in which there are no openings. Data on two such buildings, now under construction, are given in this article.*

THE IMPORTANCE that attaches to repair and adjustment of aviation instruments and armament and the high degree of precision required in this work have made it worth while to construct at the more important Army air bases buildings specially designed for these operations. These are known as the "Armament and Instrument Inspection and Adjustment Buildings." Some features of the design were developed after much study of the special requirements; later, changes were made in the plans as the result of experience in building two structures of this type, one at Hamilton Field and one at March Field, in central and southern California respectively. Summarized in the following are data on general structural design, arrangement and equipment of the two buildings. Similar in the main, differences are largely in details arising from adaptation to the climates of central and southern California, respectively.

The shell of the structure itself is a boxlike concrete frame one story high, surmounted by a low parapet around a flat concrete roof. Rigidity is increased by transverse concrete walls near each end. Oblong in plan, the structure has outer walls 12 in. thick above floor level, with greater thickness below that level in accord with foundation needs. Interior concrete walls are 10 in. thick. A concrete partition extending along the greater part of the center line, divides the building into two compartments. Through this dividing wall there are no doorways or other access openings; to go from one side to the other it is necessary to pass through the shipping and receiving room at the front end of the building.

Double-door entrance

The entrance arrangement is notable. Outside doors, which are at the front end only, include two 3x7-

Fig. 1. Instrument building at March Field in advanced construction stage. Walls have no windows; no skylights in the roof; only one door.

ft. doors and one 10x10 ft. in size for receiving and shipping. All three lead into vestibules from which other doors give access into the building interior, much as in going through an air lock into a compression chamber. In case a second floor is added later a stairway will go through an opening in the ceiling at the front of the building where a temporary panel is provided.

Where soil conditions necessitate the use of pile foundations, the concrete bases of exterior walls are spread to a 3-ft. width, thus making it possible to stagger the supporting piles, about 4½ ft. apart, on alternate sides of the wall center line. Interior columns, 16 in. square, are set on pedestal bases, spaced about 18 ft. apart. Where these column bases are on piles, there are six piles per column. Wood piles are used (topped by a 10-ft. steel cylinder and concrete cap) driven to a depth of about 60 ft. below grade. Tops of the six piles are bonded in an 18-in. slab of concrete, 5½x8 ft. in plan, surmounted by a pedestal for the column.

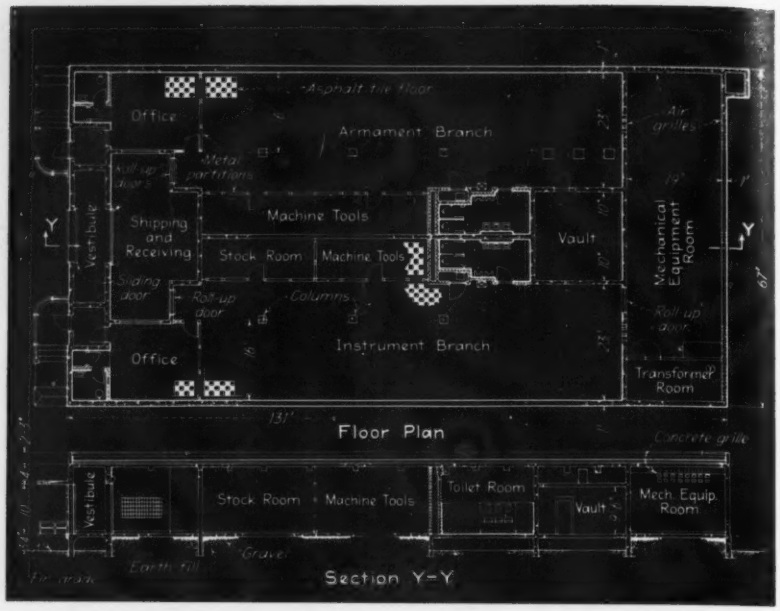


Fig. 2. Floor plan and elevation of the buildings for work on airplane instruments and armament. Note the single front-door entrance and the location of the air conditioning equipment at the rear of the building.

Roof construction

The roof consists of a 6-in. concrete slab carried on reinforced-concrete beams in the usual manner, with panels up to 9x17 ft. in size. A parapet 2 ft. high, built as a continuation of the outside walls, extends entirely around the roof. Copper scuppers, extending through the parapet walls 10 in. below the top, provide means of overflow on all four sides should the other drainage channel fail.

Of two different methods for finishing the roof, one uses an earth cover and the other has an insulated composition roofing. The design for the March Field building prescribed the type of roof having an earth cover. However, future buildings of this type will be constructed only with the insulated composition roofing. In both roof types a topping of lean concrete mix is used to give the surface the desired slope for drainage. This topping is 4½ in. thick at the edge and 2½ in. at the center. At March Field a 6-in. wire mesh reinforcing was put into the topping. In the composition roof the sloping surface of the lean topping is covered by a 2-in. layer of wood-fiber insulation and this, in turn, covered by an asphalt-and-gravel surface. This surface meets standard government specifications 5ACS.

The "earth" roof at March Field consists of a 2-in. layer of coarse gravel put on the lean-mix concrete, overlaid by 9 in. of soil. Copper-lined scuppers through a curb around a 3½x7½-ft. central catchbasin provide for drainage water escape. A 10-in. downspout, with double screens, leads downward from the basin and passes out beneath the floor of the building to a storm sewer. The roof design providing for a composition roofing divides the roof area into two halves, each draining into a 6-in. downspout.

Concrete specifications, the same for all parts of the structure except the roof topping, require that the mix be made with 5.3 sacks of cement per cubic yard and that it develop a minimum compressive strength of 3,400 psi. in 28 days. The water content is required to be less than 6.75 gal. per sack of cement. Concrete is made with cement that meets federal specifications SS-C-191a.

Concrete floor

In the building at Hamilton Field, finished floor level was established 3 ft. 4 in. above finished grade of the adjoining ground, which is only a few feet above the water table. The fill below floor level, which was put in with optimum moisture content and packed into place with power tampers, was placed inside the concrete walls as a preliminary to pouring the floor slab. This is a 6-in. concrete floor, reinforced with wire mesh, and a ½-in. asphalt joint was made on all sides between concrete in the floor and that in the walls to prevent transmission of sound or vibration.

In the absence of windows, particular emphasis is put on the lighting system for which fluorescent lamps were selected. Throughout the building these are placed to give, at bench height, an illumination intensity of about 20 foot-candles. Additional lighting units are provided in certain locations.

All power-driven machines and other mechanical equipment are required to be mounted on either cork or rubber cushions, placed between machine and foundation to minimize noise and vibration. In addition to concrete bearing walls that subdivide the interior, hollow clay tile walls or metal partitions are used for supplementary subdivisions. Floor covering is asphaltic tile 3/16 in. thick, laid in a checkerboard pattern made by two shades of gray.

Insulated walls

Walls and ceilings throughout the building are required to have an insulating and sound-deadening lining

whose characteristics only are specified; selection of materials is left to the contractor. For the walls, specified minimum thickness of the insulating material is 1 in., weighing not less than 2.2 lb. per sq. ft; material to be fire-resistant, termite-proof, resistant to fungus growth and to have a thermal conductivity of not more than 0.458 B.t.u. per hour per square foot per degree F. For the ceiling the requirements are practically doubled; namely, 2-in. minimum thickness, weight 4.4 lb. per sq. ft. and corresponding thermal conductivity not less than 0.229 B.t.u.

The specified requirements are met by a paneling of pressed-fiber insulating board on walls and ceiling, over which a ¼-in. plaster coating of prepared cork is put on. This cork coating is applied in two operations; in the first the cork preparation is mixed with water only; in the second or finish coat there is, in addition, sand and Portland cement to give the desired surface finish. Columns and ceiling beams are not covered with the insulating material, but the entire interior surface, except the floor, is finished with aluminum paint.

Mechanical equipment

Mechanical equipment for heating, ventilating, etc., is located in a compartment at the rear end of the building. The air conditioning installation, essentially, includes a main supply fan driven by a 3-hp. motor designed to circulate 7,415 cu. ft. of air per minute against a static head of 1½ in. of water. Into this circulatory system the heating equipment is designed to deliver 260,900 B.t.u. per hour and the combination of evaporative condenser, cooling coil and refrigeration compressor is able to remove 264,000 B.t.u. per hour.

Because of complete absence of any natural ventilation, the air conditioning system is designed for a broad range in heating, cooling and humidity control. The mechanical equipment is designed to meet a temperature change in outside air from more than 100 deg. F. to the freezing point. The installation is to compensate completely and automatically for external atmospheric changes and to maintain within the building an average temperature of 80 deg. F., dry bulb, and 65 deg. F. wet bulb, with outside air at 100 deg. F., dry bulb and 73 deg. F., wet bulb temperature. Outside air and/or recirculated air is filtered, humidified, heated or cooled, as required, by passing through water sprays, steam coils, or direct expansion refrigerant coils situated in a plenum or mixing chamber.

Zone control

The building interior is divided into seven zones, with thermostatic control in each zone and a separate duct delivering conditioned air to each zone. The thermostats determine the position of the zone dampers at the plenum chamber, thus regulating the delivery of conditioned air into each of the seven zones.

Change-over from cooling to heating and vice versa is an entirely automatic operation. When the outside temperature is below 60 deg. F., the air conditioning system remains on the heating cycle, and a gas-fired steam boiler with 1,850 sq. ft. of heating surface supplies steam to the heating coils in the plenum chamber. Also, the humidity control circuit is energized, a humidistat controls spray nozzles in the entering air stream, and the proper dampers are positioned.

As soon as outside air temperature rises above 65 deg. F., the system changes over to the cooling cycle. That is, the gas boiler is cut out, the humidity control circuit is disconnected, the compressor and evaporative condenser circuits are closed, and the dampers are positioned for cooling.

When outside air temperature rises above 80 deg. F., the dampers are automatically positioned to admit less outside air and more recirculated air is used in the conditioning chamber.

There is a 25-kva. standby motor-generator set to provide power for lighting and fans if the main power supply fails. The auxiliary set is not designed to take the full power load of all the mechanical equipment.

Provision is made in connection with starting of the standby motor-generator set to cut out automatically the compressors and cooling equipment, and to blow air through the building with the main air supply fan and exhaust fans operating. Under such conditions all outside dampers are opened wide and recirculating air dampers are closed.

No air conditioning equipment and controls had to be especially designed for the job; the one requirement was that it should be first-class and adequate in all respects.

The buildings described in the foregoing are now under construction at Hamilton and March fields, California by the U. S. Engineer Department. Maj. Gen. Reybold is Chief of Engineers. Construction of the building at Hamilton Field is under supervision of Col. K. M. Moore, district engineer, U. S. Engineer Department at San Francisco. At March Field supervision of Col. E. C. Kelton, district engineer, Los Angeles.

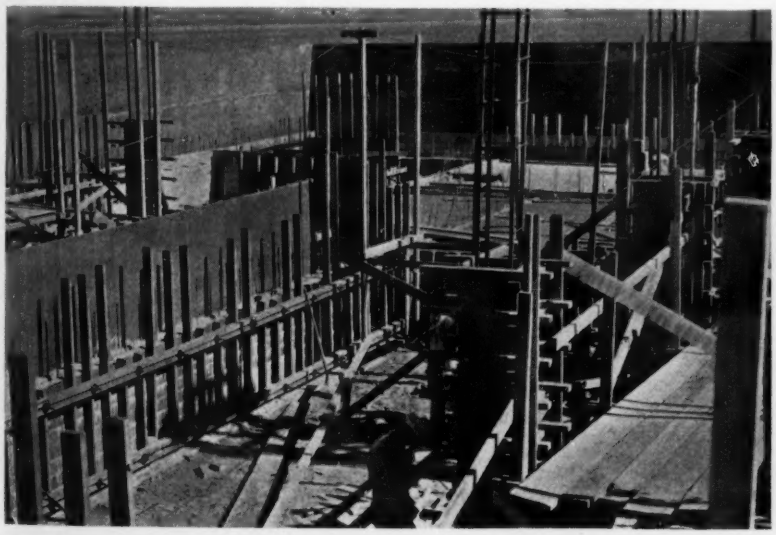


Fig. 3. An early construction stage of the building at Hamilton Field, the floor level is indicated by flat surface in right center.

Shops to Keep a Motorized Army Rolling

***Contents in Brief**—Mechanical units of the modern army require extensive repair and reconditioning facilities, which are being provided in garage-type structures 480x520 ft. in size. Structural design feature is the use of almost 500 timber trusses supported on concrete columns spaced at 40 ft. in both directions. Truss framing and column connections illustrated in detail.*

MECHANICAL UNITS of today's army require extensive shops for maintenance and repair, and plans have been prepared by the construction division, Office of the Quartermaster-General, for a standard building to centralize the handling of this modern military problem at strategic points throughout the country. Following extensive studies a standard design was adopted for two essential reasons: (1) the drawings, with minor variations, could serve for all projects, resulting in a considerable saving in time, and (2) if the interior arrangement and functioning at all shops was identical, the personnel could be transferred without having to learn new routines. Each of these buildings will be fully equipped to handle as many as eight thousand mechanical repair units per month. At the present time one of the structures is being erected at Fort Devens, Massachusetts, and more will be erected so that a shop will be available within reasonable distance of all motorized units of the army.

In general, the structure might be considered as a garage-type building of unusual size and completeness of facilities. In plan, it is 480x520 ft. and these acres of floor area are divided by interior partitions or less definite boundaries into stations for handling all types of mechanical reconditioning work. For example, along one wall is an 80-ft. width of partitioned rooms assigned to operations of greasing, cleaning, painting, stenciling and storage of parts. An 80x80-ft. area near the main entrance of the structure contains the administrative offices, and a corresponding area near the rear of the building contains the heating plant and the transformer room. With the exception of some other smaller rooms for tire repair, ignition and battery work, the remainder of the area is designated for general repair operations without dividing partitions. This working area, with minor encroachments, is 520x280 ft. Vertical clearance under the trusses is 16 ft. 1½ in.

Framing plans for the structures provide a brick and concrete one-story building with timber roof trusses spanning 40 ft. in both directions. In the 520-ft. direction intermediate timber trusses are introduced at 20-ft. intervals. Over each 40-ft. bay are monitors extending the entire 480-ft. width of building. These thirteen monitors have fixed sash on both sides designed to provide the most advantageous day lighting.

Concrete columns were adopted to overcome what are considered to be, under present conditions, excessive lumber requirements, and to eliminate the use of structural steel. Loads are relatively light and a typical 26-ft.-high interior column is 20 in. square, reinforced with twelve ⅝-in. round vertical bars and ⅜-in. round ties at 12-in. spacing. At truss elevation the columns are widened in both directions to provide supports (see illustation). Typical interior column footings are 4x4 ft. in plan and 2 ft. 4 in. thick, placed on foundation material having a minimum bearing value of 7,000 lb. per sq. ft.

The floor, which may be subjected to heavy loads, is an 8-in. concrete slab designed for a live load of 1,000 lb. per sq. ft. Top steel consists of ⅜-in. round bars at 15 in. both directions, and the bottom steel is ⅝-in. round bars at 8½-in. spacing both ways. Construction joints are allowed at about 120-ft. spacing, but there is only one expansion joint in each direction, consisting of a 1½-in. space filled with mastic and compound.

The interesting structural feature of the building is the extensive use of 40-ft. timber trusses. This arrangement, with intermediate trusses in one direction, provides a total of almost 500 trusses, not including the lighter weight units used in the monitors.

In general, the trusses are of relatively standard design built up of 3x12-in. timbers fabricated with bolts and split ring connectors. The roof was designed using relatively low-stress wood grades of 1,200 lb. per sq. in. for all trusses, purlins and beams. Trusses are not designed to carry monorails, or other concentrated loads. All hoisting to be done within the shop will be carried out by the use of floor cranes.

The interesting feature of the truss design and arrangement is the method of support at the columns. Details of this design are indicated in the accompanying drawing, which shows both longitudinal and transverse truss connections at a typical interior column.

The transverse trusses (at right angles to the monitors) support the roof loads carried on 6x14-in. timber purlins, both at normal roof elevation and along the tops of the monitors. Roof construction is completed with 2x6-in. rafters at 18-in. spacing covered with sheathing and built-up membrane.

The lower chords of these transverse trusses rest on the flared shoulders of the concrete columns. Above this elevation the concrete columns extend at their normal size to the top chord.

In the other direction (parallel to the monitors) the columns are flared to provide similar seats to carry the longitudinal trusses. However, these trusses have no direct bearing at the elevation of the bottom chord, but are connected through the column for tension by two ¾-in. bolts in pipe sleeves left in the column. The main support for these trusses (see illustration) is obtained by short vertical 4x14-in. timbers extending down

from the upper chord to seat on the widened column. These vertical timbers are held in position on the concrete by steel straps of U-shape which bolt across the columns. Two 4x14-in. timber splice plates maintain the alignment of the upper chords of these trusses at the top of the concrete columns.

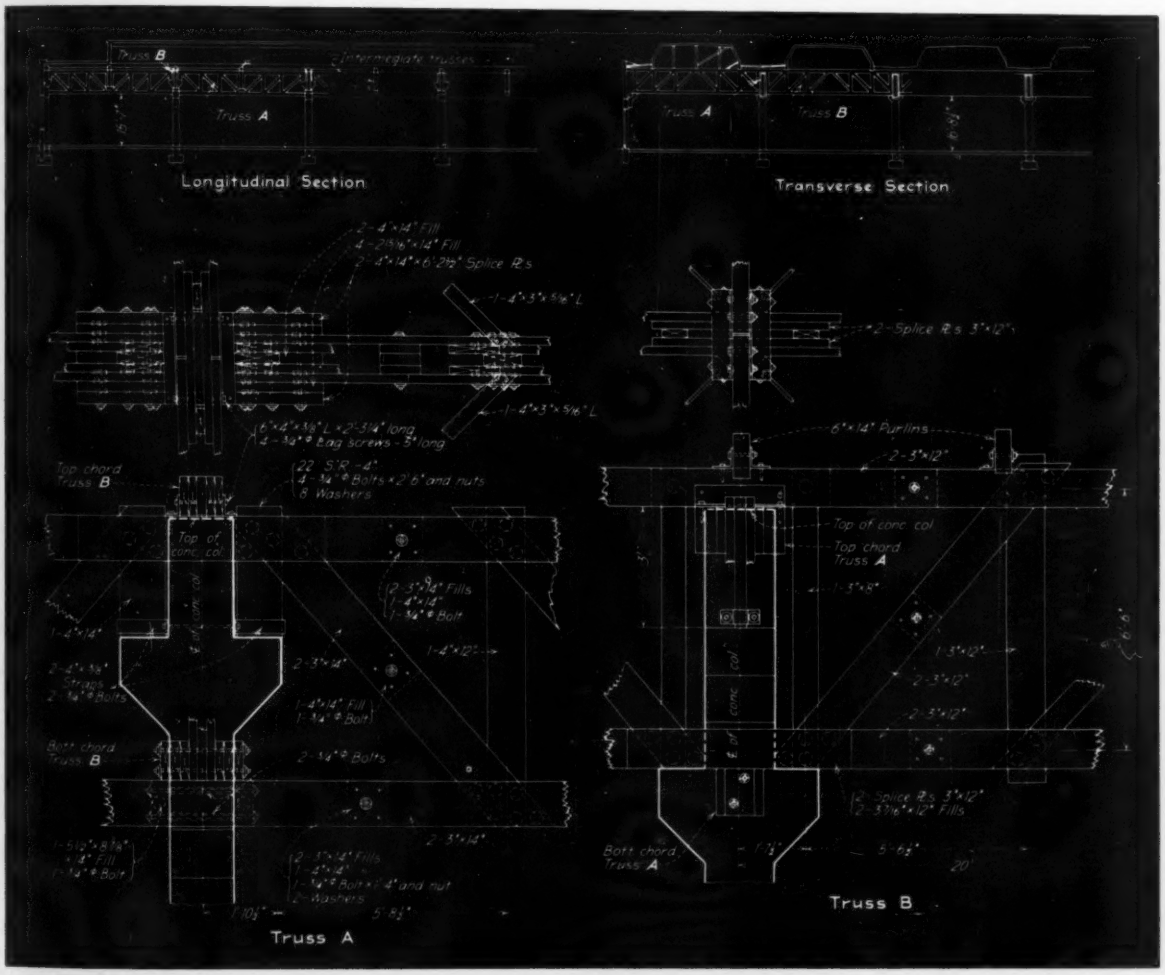
The alternate trusses in the longitudinal direction are intermediate (20-ft. spacing) between columns and are supported directly by the upper and lower chords of the transverse trusses.

Exterior walls include a 15-ft. height of brick from concrete footing to the head-line of the numerous windows. Above this elevation the wall is a 1½-in. thickness of pneumatically placed concrete on metal lath. Exterior windows are stock commercial pivoted sash. Studding supporting the upper section of wall is 2x6 in. on 20-in. centers.

The building will be heated entirely by unit heaters from steam supplied by four boilers located in a boiler room in the corner of the truck shop. The steam supply to the unit heaters will be governed by thermostats through an automatic steam valve and some of the units are designed to introduce a definite proportion of fresh air. Steam and vacuum return piping, connecting the heater units, is hung as high as possible on the walls to provide maximum headroom. Power-driven exhaust fans of 8,000-cfm. capacity in the roof will handle ventilation in correct proportion to the amount of air introduced through the heating units. These ventilators are located to serve the particular needs of the various operations in different parts of the building.

General lighting over the shop area is of about 20 ft.-candle intensity provided by dome reflectors mounted 15 ft. above floor level. Corresponding lighting in the office areas is about 30 ft.-candles. To conserve strategic materials and to take advantage of increased current-carrying capacity of conductors, feeder and branch circuit wiring is installed exposed on insulators mounted on the timber trusses. For those lights suspended between trusses, the wiring is installed in short lengths of conduit suspended from messenger cables. More than 600 power outlets are installed over the extensive floor area for the use of portable electric tools. The total electric load approximates 1,100 kw. for the building, with 700 kw. lighting.

These repair shops have been designed, and are being built, by the Quartermaster Corps, under the direction of Brig. Gen. Brehon B. Somervell, chief of the construction division. Col. W. D. Styer is deputy chief of the division.



About 500 timber trusses of 40-ft. span are required to support the roof of the 480x520-ft. shop building. Arrangement of trusses and detail framing at columns are shown.

Factories and Housing for Defense

As Presented in ENR Articles

BUILDINGS built by and for the Army and Navy, such as those described in the majority of the articles in this issue, are by no means representative of all types of defense-developed buildings. Factories for planes, tanks and materiél generally, and housing for troops and defense industry workers are two other classes of buildings that account for many millions of dollars of investment.

Many of these factories and housing developments have been covered in recent articles in ENR and, to make the information on defense-developed buildings in this issue complete, the most pertinent of these articles are briefed and indexed below. Reference is also given to articles on specific building elements that have appeared under the general heading of Building Designer's Library.

Southern California Plane Plants Oct. 24, 1940 p. 560

Possibility of earthquakes is taken into account in foundation and frame design of such factories as Douglas, Lockheed, Vultee, Vega and Consolidated. Sawtooth roofs and 200-ft. column spacing are common. Metal roofing is almost universal. Flooring, lighting and door practices outlined. Framing spans and overhead clearances fitted to production line requirements.

Boeing Bomber Plant, Seattle Oct. 24, 1940 p. 566

Fifteen-acre plant built in 90 days. Largely sawtooth trusses, carried on 35-ft.-high columns. Some two-story construction. Assembly shop spans of 125 and 200 ft. Notable feature of building is extensive use of underground rooms and traffic tunnels that leaves floors free for manufacturing operations. Utility layout of pipe and electric conduit is unusually complete. Part of plant is carried on wharf construction over an adjacent waterway.

Pratt & Whitney Plant, East Hartford Oct. 24, 1940 p. 564

In expanding from 400,000 to 1,600,000 sq. ft., several new design practices were developed. One is a footing detail that does not require the column dowels to puncture the waterproofing membrane. Another is the substitution of arched for straight bottom chords in the roof trusses, which increases headroom and decreases the amount of steel required.

Aluminum Company, Vancouver, Wash. Nov. 7, 1940 p. 630

Transforming a farmland site on the Columbia River to an industrial establishment for producing 60,000,000 tons of aluminum annually required a dozen buildings in which corrugated aluminum sheet walls and aluminum sash were extensively used. Job coordination was a big factor in the speed attained in construction.

Buda Diesel Engine Plant Nov. 7, 1940 p. 602

Bowstring timber trusses of 50-ft. span supported on steel columns and carrying a timber deck, insulated and covered with asphalt felt, form the roof, and windowless brick walls the enclosure of a 164x250-ft. factory for tank engine manufacture at Harvey, Ill. Pressure ventilation, with 1-oz. differential pressure, keeps dust out of plant. Airlock doors used.

Chrysler Tank Arsenal, Detroit April 10, 1941 p. 526

Column spacing and overhead clearances in a 500x1,380-ft. building were laid out to meet production line requirements of a new type of machine. Nearly 95 percent of wall surface is glass in steel sash. Built in seven months of wet and winter weather. Handling storm drainage and installing utilities were major jobs. Locomotive crane erection of steelwork. Railroad locomotive heated building for installation of concrete floors and machine foundations.

Q. M. Warehouse, Columbus, Ohio April 24, 1941 p. 596

Four thin shell concrete barrel roof spans of 45 ft. each make up the width of each of three warehouses 1,562 ft. long. Roof divided into 80-ft.-long sections by expansion joints, each section being built in a 12-hr. shift. Walls are brick, and frame is reinforced concrete. Traveling forms moved from end to end of each bay. Concrete mixed in paver, discharged into bucket, raised by crawler crane to hopper on top and buggied to place.

North American Aviation, Dallas May 8, 1941 p. 732

One of the first solid-wall blackout plants. Walls up to 5½ ft. are 12 in. of concrete and above this are corrugated protected metal. Main plant building is a single room 954x 904 ft. Bays are 50 ft. square with 16-ft. ceiling clearance except in assembly area where 150-ft. spans are used and ceiling is 25 ft. Floors are 5-in. concrete slabs. A cellular metal roof deck is used. An innovation is the use of 12-in. concrete baffle walls in front of all doors.

Army Mirror Plant, Cincinnati June 5, 1941 p. 890

Steel frame building 260x120 ft., with solid brick walls; windows only in office section. Basement under most of site. Walls of bearing type built before steel for frame arrived. Tar-and-gravel roof on metal deck. Completely air conditioned, with equipment in penthouse. Divided into control zones. Paint spray rooms kept at lower pressure than rest of factory. Began manufacturing mirrors 157 days after plans were started.

Wright Engine Plant, Cincinnati July 3, 1941 p. 16

Described as the nation's largest one-story building, this steel framed factory is 1,320x1,064 ft. in plan. Built in sections to permit early installation of machinery. Floors are concrete, walls of 8-in. hollow tile include a 7-ft. line of steel window sash; special clip angles are attached to the windows to permit quick installation of blackout panels. Basement, occupying 225,000 sq. ft., is framed in reinforced concrete with some columns designed for 270-ton loads. A few concrete beams are as large as 30x30 in. in section. Main roof bays are 60x72 ft. Roofs are butterfly-type monitors covered with cement tile, cork and four-ply tar and gravel.

Westinghouse Fluorescent Lamp Works July 3, 1941 p. 34

Built to meet the defense plant demand for fluorescent tubes, this 224x885-ft. steel framed building at Fairmont, W. Va., utilizes special cantilever-type roof trusses. Anchor spans are 60 ft. and main center span is 100 ft. Longitudinally, bays are 25 ft. No windows are used in the solid brick walls. Roof is poured gypsum, completed by built-up membrane covering. Regular air conditioning, for which cooling water is supplied by pumping from an abandoned coal mine, is supplemented by an electrostatic filter to catch finest dust particles. Concrete floor slab is divided into 50x60-ft. panels by cork construction joints; wearing surface is ¾-in. asphalt. Fluorescent lighting is used, with a 25-ft.-candle intensity in factory and 50-ft.-candles in office.

Ford Plane Engine Plant, Dearborn July 31, 1941 p.158

Two-story factory is entirely surrounded by a four-story service bay, in which are located offices and utility rooms. Plan dimensions are 360x1,400 ft. Frame is steel, walls brick, with enameled steel window sills and awnings. Basement tunnels carry all utility lines. Continuous beam framing is used. Foundations required 3,500 tons of spiral-welded pipe piles. Floors are concrete, with a lean topping in which pipes are embedded, and surface is wood block. Fluorescent lighting and electrostatic air filters are other features. For construction during winter, entire building was enclosed in weatherproof shell, largest ever used.

Packard Plane Engine Plant, Detroit Sept. 11, 1941 p.354

Three new steel-framed buildings, each of a different layout, were erected among the existing buildings of the motor car plant. Assembly building has 40x47-ft. bays, and utility and service rooms are in penthouses framed separate from roof. Penthouse roofs are rigid frames. Test-and-teardown building has 40x60-ft. bays, and its test cells are specially soundproofed. Four-story office building is made up of wide exterior bays with narrow corridor bay in center. Hung acoustical ceilings incorporate flush lines of fluorescent lights.

Timber Airplane Factory Oct. 9, 1941 p. 482

New 260x780-ft. Vancouver factory of Boeing Aircraft Co. of Canada, Ltd., is framed in timber and enclosed in plywood. Double Warren trusses of 128-ft. span were assembled from mill-cut, bored and grooved timbers at rate of 5 per 8-hr. shift. Joints are made by flush type shear plate connectors. Supporting columns are integral part of truss. Bents, which were assembled at final location in building, were raised upright by stiffleg derricks. Plywood enclosure panels come to job in 8-ft. lengths, 32 to 48 in. wide.

Bomber Plants, Tulsa, Ft. Worth Oct. 23, 1941 p. 133

Two of the largest factory buildings ever planned are being constructed under the direction of the Army Engineers. Each is 4,000 ft. long, 65 ft. high and divided into two bays 120 and 200 ft. wide. Windowless, the buildings have walls and roof of steel panels filled with rock wool for insulation and acoustical control, and faced on the inside with fiber glass mats for light reflection. Under construction day and night, the buildings are floodlighted with an elaborate system of lamps on tall towers.

Navy Building at Glenn Martin Plant To be published

Evolution of airplane assembly building design advances another step in the 400x1,000-ft. structure for the Navy at the Glenn L. Martin plant, Baltimore, which includes: (1) steel columns at mid-span weighing 580 lb. per ft., designed to carry lateral forces from a 100-ft. section of 66-ft. high wall, and (2) 100-ft. spans of longitudinal trusses of cantilever design.

Addition to Boeing Bomber Plant To be published

A 22-acre addition to the existing new 15-acre Seattle plant employs 300-ft. span roof trusses spaced 50 ft. apart and carrying a sawtooth roof. An 80-ton upward-swinging door, giving a 35x295ft. opening, is carried by one truss. All trusses are pin-connected to columns. Extensive use is made of underground traffic tunnels.

Temporary Barracks for the Navy Oct. 24, 1940 p. 535

Units at Newport, R. I., consist of two-story H-shaped timber buildings for 232 men. Each leg 100 ft. long contains two 14-ft. bays. Diagonal sheathing is covered with cement-asbestos shingles for exterior walls. Interior is surfaced with hard fiberboard. Gabled roofs are covered with mineral-surface asphalt shingles. Concrete floors used in toilets and washrooms, where walls are either cement-asbestos board or cement plaster.

Army Cantonment Barracks Oct. 24, 1940 p. 537

Each two-story restangular timber building houses 63 men. Plan dimensions are 29½x80 ft. Enclosure is ¾-in. sheathing, building paper and drop siding or plywood. Roofs are covered with bituminous roll roofing. Gypsum or fiberboard on interior walls.

USHA Defense Housing Oct. 24, 1940 p. 574

At Montgomery, Ala., next to the Army's Maxwell Field, workers' families are housed in 85 one-story buildings having special moistureproof hollow tile and brick-faced walls, concrete floors, and treated-timber roof trusses. Partitions are plaster on expanded metal. Doors and sash are metal.

Housing for Navy Families Feb. 27, 1941 p. 343

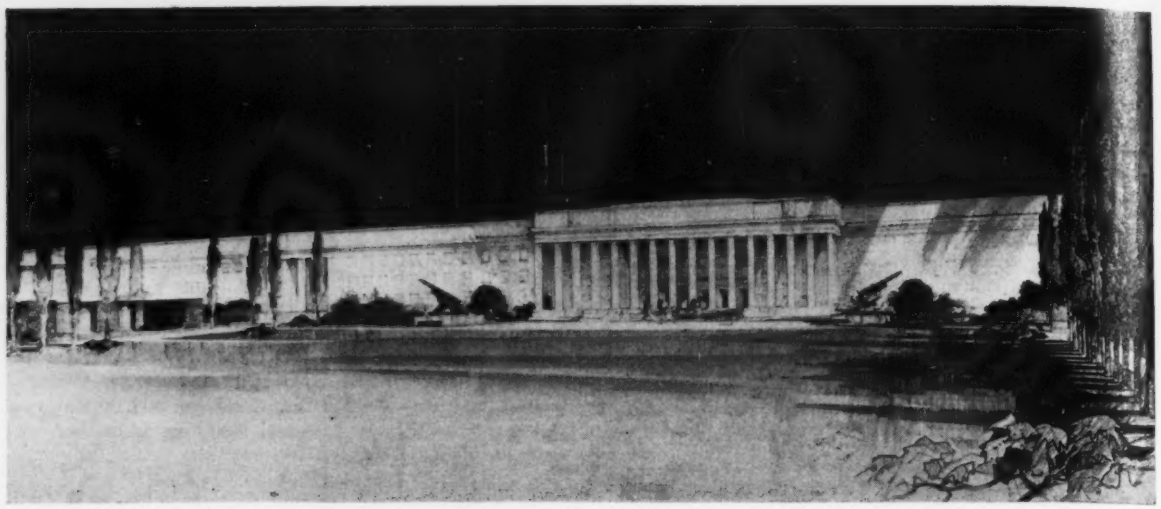
Typical of the housing provided for married enlisted men at various naval stations are the 92 apartment buildings at Norfolk, of which some are two-story and some one-story. Floors are concrete and frames of patented Stran Steel type. Exterior walls have asbestos-cement siding, or a simulated brick fiberboard. Roofs are sheet metal. Interior finish is composition wallboard.

FWA Prefabricated Defense Housing May 22, 1941 p. 813

Audubon Village, at Camden, N. J., is typical of houses built under "Camden Plan" of financing, and represents most advanced example of prefabrication. Panels built in shop and assembled on foundations in field. Assembly jigs and power hand tools featured shop work. Asphalt shingles on walls and roof. Interior is plasterboard and two coats of plaster. Wood trim, sash and doors are specified.

Building Design Data

Blackout Plant Air Conditioning	May 8, 1941	p. 751
Fluorescent Lighting	May 22, 1941	p. 819
Concrete Wall Reinforcing	June 5, 1941	p. 900
Lighting Through Glass Block	July 3, 1941	p. 29
Air Conditioning Costs	July 17, 1941	p. 112
Ventilation by Wall and Monitor Sash	July 31, 1941	p. 176
Architectural Concrete Forming	Aug. 14, 1941	p. 240
Structural Welding Drafting	Aug. 28, 1941	p. 310
Heating with Direct-Fired Units	Sept. 11, 1941	p. 363



Army's New Headquarters Building

***Contents in Brief**—Of pentagonal shape, 921 ft. on each side, this new general headquarters for the War Department will be built across the Potomac River from Washington, and will house a population of 20,000. Communication within the building and transportation facilities for employees provide unusual problems.*

TO SERVE as a general headquarters for the War Department, at least during the present emergency, an office building of mammoth proportions will be constructed in Arlington County, Va. The project, including design and construction, is being carried out by the construction division of the Office of the Quartermaster General, and the estimated cost of the structure is about $31,000,000. A cost-plus-fixed-fee contract has been awarded, and foundation work is under way. Need for adequate and centralized office space to house the rapidly expanding War Department organization resulted in extensive study of the proper site and appropriate design for the building, with problems of size, appearance and location receiving the personal attention of the President.

The site selected is a 320-acre tract, originally planned for the Alexandria Quartermaster Depot, located about a ten-minute drive south of Washington, and bounded on the south by Columbia Pike and on the west by Arlington Ridge Road.

The structure will be in the shape of a regular pentagon, consisting of two pentagonal "rings" of buildings, erected around a large inner court of about 6 acres, which will be fully landscaped. Each outside face of the building will be 921 ft. long, and each inner face on the court will be 360 ft. long. The distance through the double ring of buildings, from court to outer wall, is 385 ft. A 40-ft. width of open area separates the two pentagonal rings of buildings. In height the structure will include three stories with basement; courts will start above the first floor. Framing will be of reinforced concrete and the foundation will be on concrete piles. About 2,500,000 cu.yd. of excavation will be required to grade the site.

Facing for the outer walls will be a material yet to be approved, and the inner walls around the court may be left in exposed concrete.

Vertical communication within the building will be by stairs and ramps, supplemented by escalators in special places. There will be no passenger elevators. Horizontally, the communication system includes five hallways extending from corner to corner of the inner ring of buildings.

Designed for an initial population of 20,000 persons, based on an allocation of 125 sq. ft. of floorspace per person, this number of employees will not be exceeded until it has been demonstrated that the transportation facilities to and from the District of Columbia, across the Potomac River, will not be overburdened.

A major problem of planning has been to provide adequate facilities for getting the thousands of persons into and out of the building with reasonable promptness, without confusion or staggering the working hours. Almost 15,000 will live in the District, 2,600 in Virginia and 2,400 in Maryland.

A large bus terminal will be installed in the basement, and passengers will enter by stairs from the first floor, after passing through a turnstile, where fares will be deposited. Two loading lanes will be provided for the buses, with seven loading stations in each lane, each capable of handling two buses at a time. Each lane will be 900 ft. long and 20 ft. wide.

The project is being carried out under the general direction of Brig. Gen. Brehon B. Somervell, chief of the construction division, Office of the Quartermaster General. G. E. Bergstrom is architect-engineer on the project; Roy C. Mitchell is in charge of structural design. Constructing Quartermaster for the project will be Capt. Clarence Renshaw. Contract for the project was let jointly to: John McShain, Inc., Philadelphia, Doyle and Russell, Richmond, Va., and the Wise Contracting Co. of the same city.

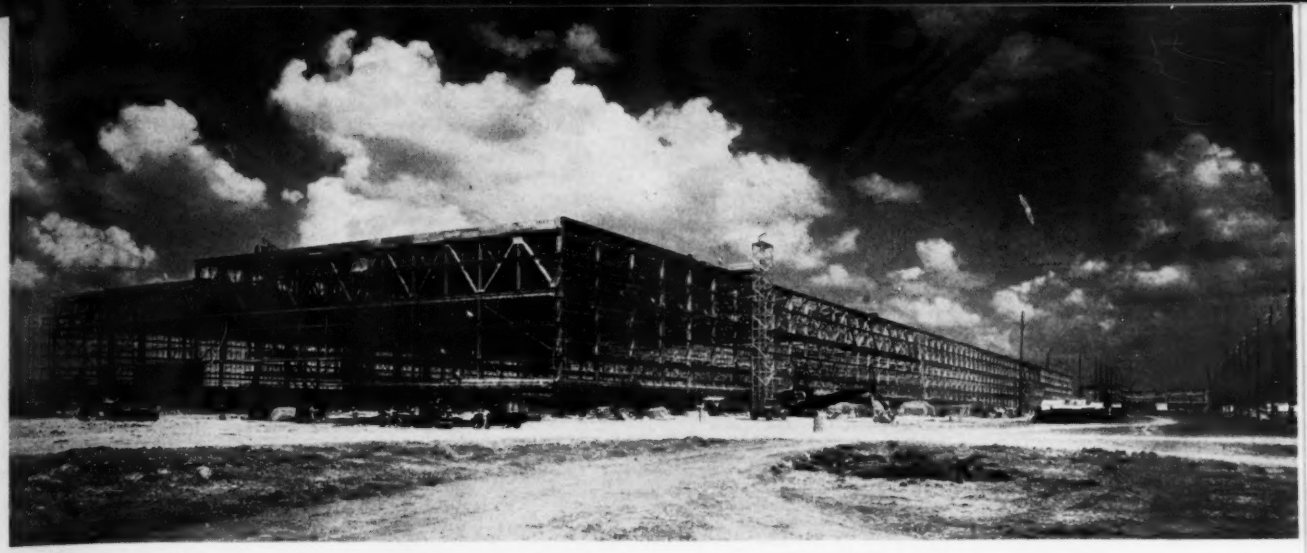


Fig. 1. Ft. Worth bomber plant, 4,000x320 ft., and 65 ft. high, is one of the largest industrial buildings ever built.

Building Bomber Assembly Plants

***Contents in Brief**—Windowless plants, 4,000 ft. long, 65 ft. high, and with two bays 120 and 200 ft. wide, are being built at Tulsa and Fort Worth. Wall and roof inclosure is by special insulated steel panels, which have acoustical and light-reflecting qualities in addition. Equipment includes air conditioning, fluorescent lighting and sprinklers. Construction work goes on day and night under floodlights on tall towers.*

SIGNIFACANT ADVANCES in both design and construction characterize the bomber assembly plants being built under the direction of the U. S. Army Engineers at Tulsa, Okla., and Fort Worth, Tex. Identical in design, the plants each contain a main building that is 4,000 ft. long and 65 ft. high, a giant among industrial buildings, but it is in a new type of insulated steel panel wall and steel deck roof and in floodlighting installations, which permit construction operations "around the clock," that the projects are particularly notable. The wall and roof panels, developed by the Austin Co., Cleveland, Ohio, in cooperation with the Truscon Steel Co. and the Owens-Corning Fiberglas Corp., consist of pressed steel panels filled with glass wool and faced on the inside by a light-reflecting fiber glass mat. A total of 7,300,000 sq. ft. of fiber glass products—mat, board and wool—are required at each plant. The night lighting installations are both of unusual size, the one at Tulsa having over 800,000 watts of lamp capacity on especially designed 100-ft. towers, a layout designed by the contractor, Manhattan-Long, in cooperation with the Public Service Company of Oklahoma.

Fig. 2 shows a site plan of the Tulsa plant, which in all important particulars is identical with the Ft. Worth plant. Each plant requires 27,000 tons of structural steel and includes a main one-story building, 320x4,000 ft., to which is attached a boiler-house, a maintenance shop and an office building, all of windowless blackout construction, air conditioned and fluorescent-lighted. Detached from the main group are a paint shop, a cafeteria and a hangar.

The long, narrow main building consists of two longitudinal bays, 120 ft. and 200 ft. wide. Outside columns and transverse trusses are spaced 25 ft. apart; center columns, between the bays are 50 ft. apart and carry longitudinal jack trusses into which the intermediate transverse trusses frame. There are 171 transverse trusses in each bay, and they provide a clearance of 40 ft. above the concrete floor which, added to the depth of the trusses (25 ft. in the wide bay, 16 ft. in the narrower one) produces a building that is unusually high for a single-story factory.

A two-level mezzanine is located alongside the center row of columns in the 120 ft. bay. Designed for the storage of various parts and subassemblies at locations convenient to the particular assembly station where they will be installed, the mezzanine is supported along one side by hangers from the 120-ft. trusses and along the other by the center row of

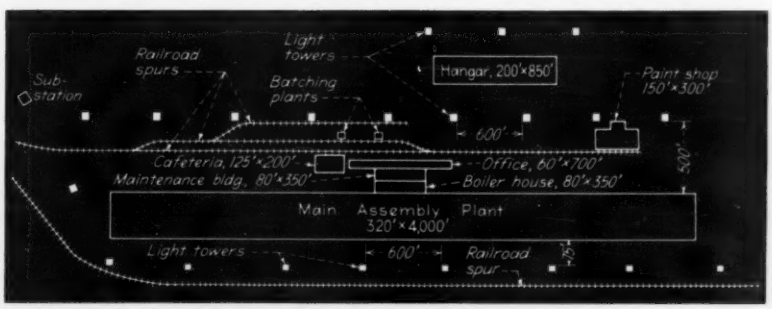


Fig. 2. Tulsa bomber plant layout, showing location of floodlight towers for night construction. Railroad tracks are for steel delivery.

Fig. 3. Installing roof insulation at Fort Worth bomber plant. Blanket of glass wool rests on a thin light-reflecting mat of fiber glass supported by expanded metal lath. The metal roof deck in the foreground will be topped by insulation and waterproofing.

columns. The mezzanine is actually 8 separate mezzanines, for at 450-ft. intervals it is interrupted by 50-ft. transverse monorail aisles that extend entirely across the building to permit the bomber parts to be moved from bay to bay. Each of the mezzanines is served by a rotary lift hydraulic elevator, large enough to handle all but the heaviest parts and bulkiest sub-assemblies as they are received by truck or rail from automotive factories, engine manufacturers or other plants participating in the bomber building program.

With food wagons, first aid stations, tool cribs, washrooms and toilets located directly below the mezzanines or on them, nothing will obstruct the free operation of the interconnecting monorail system that will serve the entire area of the building. These monorails will be capable of carrying a fully assembled four-engine bomber the entire length of the 4,000-ft. assembly aisle or transferring other loads up to 20 tons between any two points in the 1,294,000-sq. ft. building area.

Power lines are carried in some ten miles of underfloor service ducts. Each plant will have a connected power load of over 15,000 kva. and an average demand of 10,000 kva., of which 3,000 kva. will represent lighting for the main assembly building. Each plant will also have three combination gas and oil-fired boilers furnishing a total of 300,000 lb. of steam per hour at 225-lb. pressure; three air compressors each with a capacity of 1,500 cu. ft. per min. and three pumps capable of delivering 4,500 gpm. to the sprinkler systems and fire stations.

Special wall and roof construction

Objectives in the inclosure design were to obtain walls and roofs that would be shatterproof, would reduce heat transfer to a practical minimum, would afford a high degree of sound deadening, and would eliminate or control condensation.

For the roof construction, as shown in Fig. 3, small runner channels welded to the steel purlins support ribbed expanded metal lath on which is spread a thin fiber glass mat and a 3-in. blanket of glass wool. This assembly is topped by 18-gage, 1½-in.-deep and 12-in.-wide pressed steel panels. Finally, to assure that at no time could condensation form within this ceiling material, the steel panels are covered with special insulation. First a vapor seal consisting of a single application of 180-deg. melting-point asphalt, a layer of vapor-proof paper and a top mopping of hot asphalt is applied. This is then covered by 1⅜-in. fiber glass insulating board, each 16-in. by 4-ft. board being inclosed in asphalt-soaked kraft paper that extends over the top surfaces and laps 1½ in. over the edges. Waterproofing on top of the insulation consists of 4-ply standard rag felt laid in tar and covered with local gravel.

The walls, for the first 12 ft. above the ground, consist of 8 in. of brick backed up by 1 in. of glass wool bat insulation and 4 in. of acoustical block; the brick and block are tied together every fourth course, which is also the height of the insulation bats, by bar truss reinforcing members. Above the brick section, the sidewalls, in effect, are the steel roof design turned on edge, but with 18-gage ribbed facing-protective panels used on the outside instead of the waterproofing. The wall itself is composed of 22-gage channel sections 30 in. wide and 3 in. deep, extending between structural girts that are attached to the building columns. The interiors of these channel sections are filled with 4 in. of glass wool held in place by an asphalt paper backing, which in turn is attached to the steel by the use of asphalt primer. As in the roof, the interior face of the glass wool is covered with a fiber glass dust-resisting mat, which in turn is covered with light gray painted expanded metal. On the outside of the steel panels, to insure against condensation, a vapor seal is applied, composed of an application of cold asphalt primer, a vapor-proof paper and a top application of cold asphalt primer. To this outside surface 1-in. fiber glass board is attached, and holding the board in place and protecting it from both weather and objects, are the 18-gage ribbed facing panels. These panels are secured to the structural girts by means of specially designed stud bolts, with lead washers used on the outside to resist oxidation. Fiber washers are also used to assure that there is no break in the vapor seal. The ribbed surface of the facing panels provides flues, which are open top and bottom to provide ventilation to carry off any condensation that might form in the outside inch of insulating material due to any temperature changes between the inside and outside of the building.

A total of 4,460 tons of sheet steel is required for the 750,000 sq. ft. of wall and roof surface in each plant. It is claimed that these wall and roof panels not only provide the

necessary insulation but absorb between 60 and 75 percent of all factory and office noises. Also the fiber glass insulating mats that form the inside surfaces are light-reflecting. A white cement floor is also used to enhance the general lighting efficiency by reflecting light up on the underside of parts and planes on the assembly lines. As to lighting, it is planned that a 35-ft.-candle intensity will be provided at the working plane by 17,000 two-tube 200-watt fluorescent units in each assembly building.

Site lighting at Tulsa

All construction operations including steel erection are carried on by night as well as by day. Extensive night lighting installations are therefore essential. At Tulsa, after considering several types of lighting, the contractor adopted a system of towers, mounting banks of floodlights. The 21 timber towers in the system are each 100 ft. high and 6 ft. square. The 4x4-in. legs are braced with timber ties and double-cross bracing every 6 ft. on all four sides; they are also well guyed to anchors. (At Ft. Worth the clusters of lights are placed on 65-ft. wood poles.)

The Tulsa towers are arranged in two long rows with intermediate units at one end between the rows; three separate units serve the hangar area. Along the rows the towers are uniformly 600 ft. apart. On one side of the job it was possible to place the towers 75 ft. from the building line, but on the opposite side it was necessary to locate them 500 ft. distant to clear the batching plants, material yards and spur tracks; thus the tower lines are nearly 900 ft. apart.

In each tower, 83 ft. above the ground, there is an open transformer platform, and 6 ft. above it, a closed control room is located. The top of each tower carries three rails and a platform to which the floodlight units are attached.

Power is supplied from the 1,500-kw. substation at the site through a four-wire, 4,100-v. circuit. The conductors are dead-ended at each tower and swung from two cross-arms above and below tht transformer level.

There was little precedent for determining the amount of light needed for adequate uniform lighting of such a construction area. Then, too, the design was complicated by the necessity of using floodlighting equipment that could be obtained on short notice. Sufficient quantity of any type of light was not available, so a combination of types had to be used. The final result is a light intensity of 1 foot-candle in the horizontal plane and slightly better than 2 foot-candles in the vertical plane at ground level, which is considered adequate and satisfactory by the contractor.

Fig. 4. Finishing the exterior of the 65-ft.-high wall. Workmen first apply asphalt vapor seal to the steel panel surface. This is covered by the white fiber glass insulating board and finally by the ribbed steel panels.

Because of the inability to get light units all of one kind, the banks on each tower differ in make-up. There are 18 totally inclosed 2,000-watt focusing type floodlights distributed two each on the tower line farthest from the main building. Each tower also carries from 20 to 30 polished aluminum, 1,500-watt narrow-beam type units, 371 in all. On the tower line nearest the main plant are 144

porcelain enamel, 1,500-watt reflectors, 8 to 14 per tower.

At the foot of each tower is a start-and-stop pushbutton control. This control throws the contactor in the control room at the top of the tower, which in turn energizes the switching bank. Individual lights can be cut in and out by an operator climbing to the control room.

General construction operations

The large sites required for the bomber plants made grading a major operation. At Tulsa, where the site was rolling ground, 1,600,000 cu. yd. of general grading was required to bring it to desired level. This work was done with fleets of draglines working with trailer dump trucks on the long hauls and wheeled scrapers and tractor-hauled scrapers on the short hauls. Sheeted pits for column pedestals were dug by clamshell and by hand.

Because of the large number of heavy trusses, steel erection assumed unusual proportions. All of the trusses, being too deep to be shipped complete, had to be assembled on the site. The transverse trusses, weighing 40 tons and 25 tons respectively, were put together on the ground and raised into place in one piece. However, two 115-ton 200-ft.-span trusses to support future doors were too heavy for such handling and had to be assembled in the air on falsework. Incidentally, the 27,000 tons of structural steel required for each plant was more than any single steel mill or fabricating shop could deliver in the limited time allowed. Seven plants of the Bethlehem Steel Corp. fabricated the Fort Worth steel, while for the Tulsa plant the Midland Structural Steel Co. of Chicago, which had the contract, farmed out the fabrication to 17 different midwestern shops.

Both plants are being built under the direction of the U. S. Army Engineers, Col. S. L. Scott, division engineer, Dallas; Lt. Col. W. W. Wanamaker, district engineer, Denison; Lt. Col. H. A. Montgomery, district engineer, Tulsa, and Maj. H. T. Miller, executive assistant, Tulsa. The Tulsa plant will be operated by the Douglas Aircraft Co. and the Fort Worth plant by the Consolidated Aircraft Co. Both plants were designed by the Austin Co., Cleveland, Ohio, and this company is building the Forth Worth plant. Albert S. Low, Austin vice president and chief engineer, is project manager at Fort Worth, and N. R. Crater is superintendent. Capt. J. H. Anderson is resident engineer for the Army at Fort Worth.

General contractor on the Tulsa plant is Manhattan-Long, a combination of the Manhattan Construction Co., Muskogee, Okla., and the Long Construction Co., Tulsa, Okla. This job is handled through a board of directors consisting of L. F. Rooney, J. C. Long and F. F. Ditmars, at least one of whom is resident at all times; Quay Franklin is general superintendent. At Tulsa, E. A. Cornell is resident engineer for the Army and Clarence Warnke is job representative for the Austin Co.

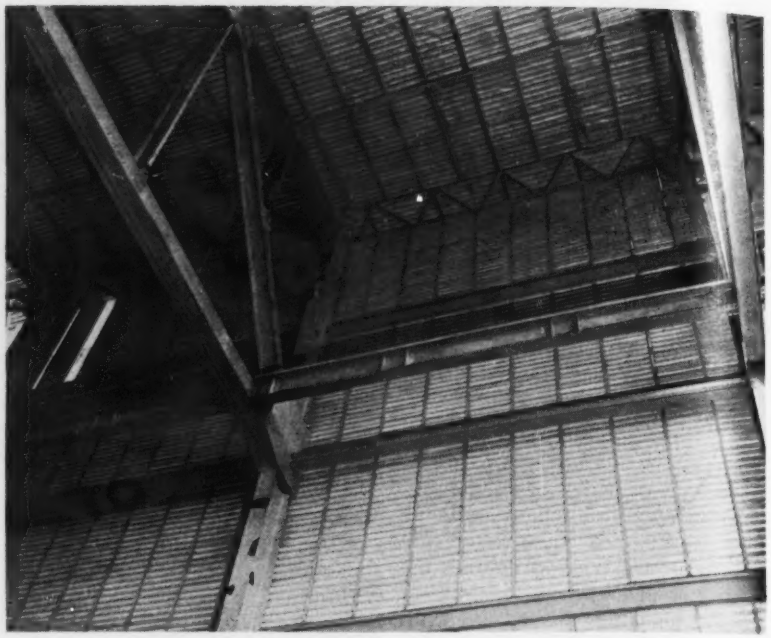


Fig. 5. Looking up inside one of the bomber assembly plants at the wall and roof surface of light-reflecting fiber glass mats held in place by expanded metal lath.

Fig. 6. Floodlights on high towers keep work going day and night at Tulsa bomber plant.

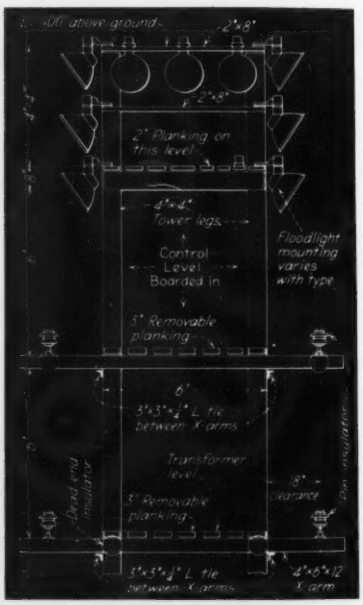


Fig. 7. Details of the top of the construction lighting towers at Tulsa bomber plant.

From Field and Office

Working problems and time-saving methods for engineers and contractors

Job-Made Scraper Saves Defense Material

Keeping the job going in the face of essential material and equipment shortages has forced many construction engineers to develop initiative and mechanical inventiveness. This summer during the application of a finished coat to blacktop street improvements it was found necessary

Home-made wipers keep paving job going, when regularly manufactured scrapers were not conveniently available.

to provide continuous cleaning wipers for the wheels of the large rollers, since the ordinary bar scrapers would not remove sufficient fines to leave a smooth surface.

When a regular wiper assembly as furnished by the manufacturer was not conveniently available, an excellent low-cost substitute was provided by installing a bar across the front and rear wheels to carry the job-made wiper assembly. The wipers were obtained by purchase of cocoa mats 18x30 in. from a local Sears, Roebuck store at a cost of $1.59 each. Some of these were cut in half longitudinally to provide mats approximately 9x30 in. for the front wheels, while others were cut to provide 15x18-in. mats for the rear wheels. The mats were hung in place by bending 18-gage sheet iron loosely around the overhanging bar and then driving spikes through the metal and cocoa mats as shown.

When the mats became clogged with asphalt fines and dirt, they could easily be removed by pulling the nails with a claw hammer, inserting a new mat section and then driving a few nails into place. This method was very effective and of negligible cost.—W. H. BANTHIN, *construction engineer, Crivitz, Wis.*

Handy Tool Box and Bench

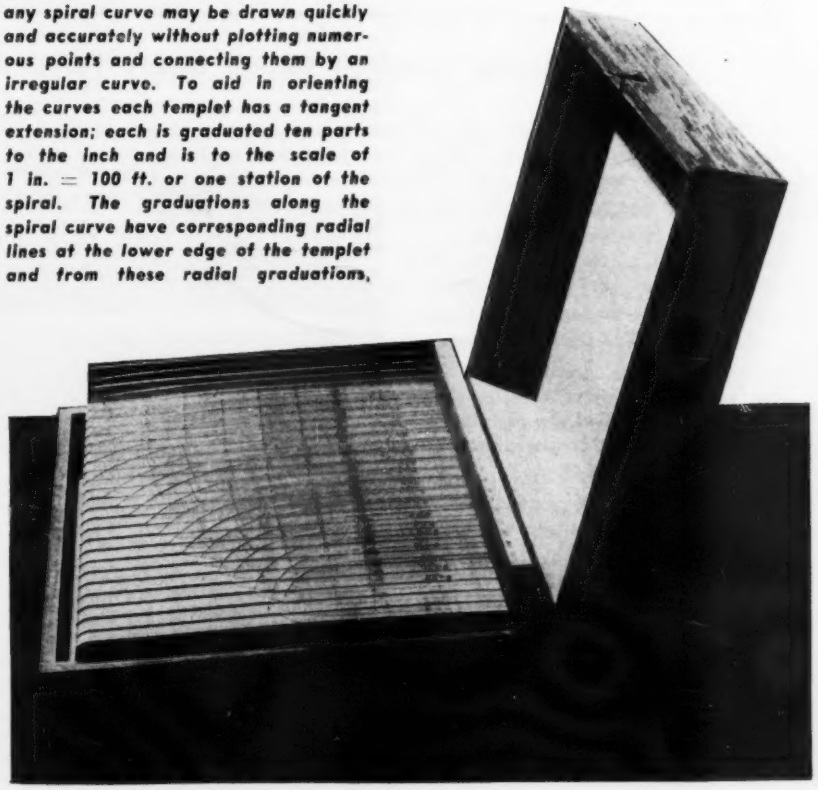
On construction work where the job site is frequently shifted, the work bench is often a ramshackle structure of rough timber without provision for preventing loss of small

Sturdy tool box and work bench of great value where tools are moved from job to job.

parts. One contractor carries to each job a permanent bench with the welded frame made from pipe on

HIGHWAY SPIRALS CONVENIENTLY MAPPED BY TEMPLET

Templets for mapping spiral curves are now being used by the state highway departments of Oregon and Washington. A set of 23 templets, boxed as illustrated, is used. The templets are known by their a value, which is the rate of increase in degree of curve per station on the spiral. With the numerous a values available almost any spiral curve may be drawn quickly and accurately without plotting numerous points and connecting them by an irregular curve. To aid in orienting the curves each templet has a tangent extension; each is graduated ten parts to the inch and is to the scale of 1 in. = 100 ft. or one station of the spiral. The graduations along the spiral curve have corresponding radial lines at the lower edge of the templet and from these radial graduations, perpendicular points to any corresponding point on the curve can easily be placed on the map. These templets were developed by the writer for the Oregon highway department — **T. R. HARTRAMPF, Hillsboro, Ore.**



which a steel plate has been welded to provide the desired flat surface. At one end the top is placed above the frame rails, to permit the attachment of a vise for working on equipment parts that must overhang their support.

The bench's other end is made with a recessed pan or tray some 5 in. below the top rail, the tray section being welded all around to the pipe. This makes a place where tools may be disassembled and serviced without loss of small parts. Also it is possible to keep the assembly free of dirt and trash.

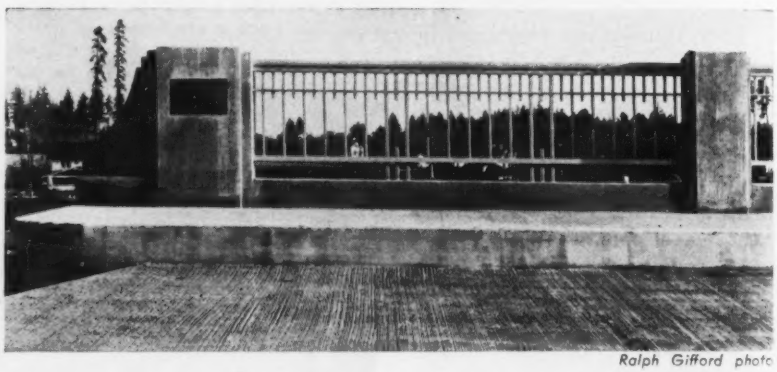
The lid over the depressed section of the bench is made of heavy plate, flanged on all sides save where the hinges are affixed. The lid is also provided with lugs and pins to hold and display effectively the tools as shown.

When moving the bench to another job, the tools are laid in the tray section, and the lid closed and rigidly held by one or more bolts through matching holes in it and the top rail. The bench is sturdy enough to stand handling with a winch truck line, and is frequently used in place of an anvil for riveting operation or forming sheet metal.—M. T. PATE, *Houston, Texas.*

***CROSSBEAM** at end of crane boom lifts outside form from 108-in. concrete pipe 12 in. thick and 24 ft. long. The casting yard is making pipe for the subaqueous line connecting the shore and intake of the new Lake Erie water supply for Toledo. At left is gallows frame for tipping the pipe.*

Bridge Handrail Design Meets Three Requirements

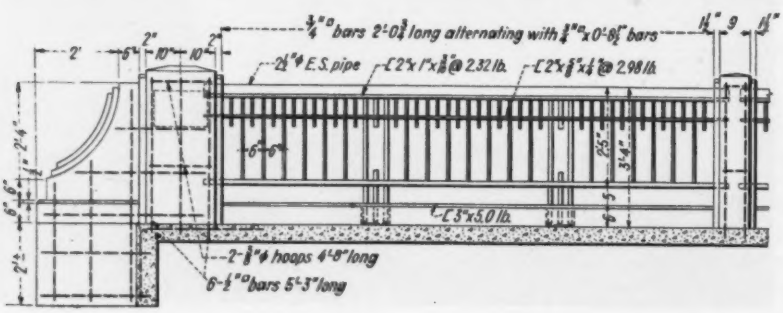
A steel handrail design, adopted as standard for Oregon's highway bridges, was developed to meet requirements that such bridge railings should (1) be strong enough to fulfill safety requirements, (2) be of pleasing appearance and (3) afford maximum visibility through slender vertical members. The general appearance is shown in the picture and dimensions are given in the drawing. In the foreground of the picture is an example of the transverse grooves made with steel bristles, now standard on Oregon concrete pavements as a means of preventing skidding.



Ralph Gifford photo

Above, steel handrail with solid concrete posts combine strength, good appearance and high visibility.

Below, dimensions of Oregon standard steel handrail with concrete posts.


¾"ø bars 2'-0¾" long alternating with ¾"ø 0'-8½" bars
2½"ø E.S. pipe
L 2"x 1"x ⅛" @ 2.32 lb.
L 2"x 1½"x ¼" @ 2.98 lb.
L 3"x 5.0 lb.
2-⅜"ø hoops 4'-8" long
6-½"ø bars 5'-3" long

Notes on Sewage Disposal

A monthly summary of current developments conducted by Willem Rudolfs

"SERVICE" CHARGE? — Something new in service charge financing is revealed by a United Press dispatch from Muskogee, Okla., dated Sept. 23. We learn that: "This city of 33,332 persons was in a furore tonight over a proposal of the City Council to place a tax of 25 cents each month on all toilet seats. City officials estimated the tax would raise $40,000 annually —enough to balance the city budget.

OIL FROM SLUDGE — Production of fuel oil by retorting digested activated sludge has been under intensive study in Japan. One investigator, Shibata (*Journal* Soc. Chem. Industry Japan, 40, p. 298 B & 331 B, 1940) shows that about 12 percent by weight of crude oil, 10 percent ammonia liquor and 60 percent coke residue is formed. After treatment, the crude oil was separated into various substances, which could be refined. One group of substances on further distillation consisted of 34 percent quinoline, 10 percent collidine and about 5 percent pyridine. The sources of these compounds are probably animal bones, fish residues and decomposing protozoa present in the activated sludge.

DECOMPOSITION OF OIL — It is a well-known fact that mineral oils (gasoline, kerosene, paraffin, etc.) gradually disappear when present in streams, sewage or sludge digestion compartments. These oils are destroyed by bacterial action. Bushnell and Haas (*Journal* Bacteriology 41, 653, May, 1941) have been able to isolate *Pseudomonas* cultures from a great variety of sources (including oil-bearing soil, petroleum storage tanks, water, abscesses and animal feces), which are capable of using mineral oils as a source of carbon and energy for their metabolism. Bacteria of other genera were also found capable of this activity and appear to be a characteristic common to many types of microorganisms. It is believed that in nature this process probably occurs to a greater extent than is generally recognized. It has been recorded that oil soaked into the ground subject to decomposition increased the temperature of the soil materially while sewage sludge with mineral oil present in small quantities appears to produce somewhat more gas.

BIO-CHEMICAL PROCESS — The biochemical treatment plant at New Britain, Conn., has been operating for a period of four years and the results obtained are of interest for those who wish to compare this method with other treatment processes. The sewage contains a high percentage of textile, plating and other industrial wastes as well as laundry, slaughterhouse and occasional brewery wastes. The plant was designed for a flow of 9 mgd., while the volume treated averages 9.35 mgd. Szymanski (*Annual Report* 1940–41) presents figures that show that for coagulation of the sewage about 140 lb. of iron salt and about 16 lb. of chlorine were used per million gallons, while the amount of air supplied averaged 0.14 cu.ft. per gal. The average purification results over four years are indicated by removal of suspended solids and reduction of biochemical oxygen demand were:

	Raw sewage	Effluent
Suspended solids ppm	175	25
B.O.D. ppm	161	33

Total operation cost, averaged over the same period, was $24.30 per million gallons treated; this figure included repairs, insurance, interest and payment of bonds. The actual plant operation cost was $16.71 per million gallons. It is of interest that the charges collected from sewer rentals covered more than the total cost of operation.

BIOLOGICAL LIFE IN FILTERS — Biological life in trickling filters varies from season to season in type as well as quantity attached to the filter medium. Tomlinson (Institute of Sewage Purification, July, 1941), studying the effect of alternating double filtration on the growth and species of organisms, found that there was some difference in the type of algae, which were more vigorously on the surface of double filters than on single filters; and that certain insects were more prevalent on these filters, but in general the type of organisms was much the same.

The quantity of film in the surface layers, however, was less in filters used for alternating filtering. With this system much of the film in the surface layer was decomposed or disintegrated and removed from each filter during alternate weeks when the filter occupied the secondary position. As a result ponding was more extensive and continued on single filters, although the rate of treatment was much greater on double filters.

From experimentation it appears that the disintegration of film is caused in the first place by biological changes. The liquid then carries away the solid particles of film. This process of film degradation in alternating filters is of particular value during the winter months when insects are relatively inactive in the surface layers of the film and ponding results.

FILTER TEMPERATURES — Variations in temperature of sewage passing through filters during the different seasons of the year are usually measured by taking the temperature of the influent and effluent. Measurements were made by Wishart and Wilkinson (paper before Institute of Sewage Purification, July, 1941) on the surface and at depths of 8 in., 3 and 9 ft. below the surface with thermographs in single filtration trickling filters. The data showed that during the year the temperature of the effluent was lower than the temperature of the settled sewage, except during the hot weather in August and September, when they were about the same.

Of considerable interest is the fact that the temperature near the surface was always lower than the temperature in the interior of the bed. In colder weather the temperature of the settled sewage was slightly higher than the temperature in the interior of the filter, while in spring and fall it was about the same, but during hot weather the temperature in the interior was appreciably higher than the temperature of the settled sewage. This brings up the interesting question whether heat is produced by biological activities sufficient to cause an increase in temperature of the liquid.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

Highway Surveys

HIGHWAY CURVES—By Howard C. Ives. 552 pp. John Wiley & Sons, New York; Chapman & Hall, London. Price $4.

Revised after ten years, this field book recognizes developments that have taken place in the past decade by the addition of three chapters, one on the selection of a curve and spiral, one on curbs, crowns and grades, and one on traffic lanes and divided highways, all subjects that have come into new prominence in that period. A fourth new chapter relates to the setting of construction stakes.

Water and Sewage

WATER TREATMENT—By G. V. James. 223 pp. Chemical Publishing Co., Brooklyn, N. Y. Price $12.

This book is primarily a compilation of abstracts from a limited survey of the literature on water treatment, stream pollution, industrial waste supplies, trade wastes and sewage treatment. It has a novel viewpoint in that sewage and industrial waste treatment are considered subdivisions of water treatment for domestic and industrial purposes. The organization of the book is poor with no clear separation between different processes and methods of treatment. The book would have made an impression if it had been published between 1910–1915, but on the basis of today's more exacting standards it is an inadequately treated hodgepodge.

Many topics of importance are hardly mentioned or not discussed at all, while others of less importance are greatly stressed. Many inaccuracies are evident. The author is dogmatic without giving the impression of sufficient background to be convincing; to wit, we read that "some workers question the bactericidal power of chlorine", and again, "spraying devices used for distributing polluted water over filter beds are a source of danger, as much of the bacteria can be carried by the wind."

The book is divided into three parts: (1) domestic water supplies, (2) industrial supplies and effluents, (3) domestic sewage. The first section is inadequate, the second exceedingly poor and the third out-of-date. The appendix gives a list of books "particularly useful for reference to all matters connected with water or sewage treatment" published between 1913 and 1938, but only British books are mentioned.—*Reviewed by* WILLEM RUDOLFS, *chief, Division of Water and Sewage, State Agricultural Experiment Station, New Brunswick, N. J.*

Construction Materials

TESTING AND INSPECTION OF ENGINEERING MATERIALS—By H. E. Davis, G. E. Troxwell and C. T. Wiskocil. 372 pp. McGraw-Hill Book Co., New York and London. Price $3.50.

MATERIALS TESTING—By H. J. Gilkey, G. Murphy and E. O. Bergman. 185 pp. McGraw-Hill Book Co., New York and London. Price $2.75.

STRENGTH OF MATERIALS—By John W. Breneman. 145 pp. The Pennsylvania State College Industrial Series. McGraw-Hill Book Co., New York and London. Price $1.50.

Three texts relating to construction materials have appeared recently. "Testing and Inspection of Engineering Materials" is a new approach to the teaching of students how to apply testing to engineering problems in which the testing of engineering materials is treated as a subject by itself rather than as an adjunct to the study of the properties of materials. By teaching the fundamentals involved in the performance of valid tests, the authors not only hope to aid young engineers who go into testing work in ever-increasing numbers to get a grasp of the basic purpose of their work, but also to establish better principles for inspection of engineering materials and, ultimately, to lead to improved specification writing for engineering materials.

Much the same approach is taken by the authors of "Materials Testing". They see in the amplification of well directed laboratory work a better way to give students a practical knowledge of the mechanics of materials than was possible under the older methods in which testing was only a minor part of the work.

"Strength of Materials" is a small book designed primarily for use in college extension service such as some of the defense training courses or for home study through correspondence instruction. The subjects covered include simple stresses, shear, torsion, riveted and welded joints, beam and column design.

Miscellaneous Notes on Booklets and Reprints

LIBRARIES where information on national defense may be expected to be found have been classified by subjects in "Guide to Library Facilities for National Defense", published by the American Library Association, 520 N. Michigan Ave., Chicago. Copies of this book are available for inspection in most of the large public libraries.

CONTRIBUTIONS TO SOIL MECHANICS, 1925–1940, a collection of fourteen papers which appeared at various times in the *Journal* of the Boston Society of Civil Engineers, has been reprinted due to the exhaustion of the initial printing. Single copies may be obtained for $1.75 from the Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

New Engineering Books

THROUGH ENGINEERING EYES—By Allan R. Cullimore. 166 pp. Pitman Publishing Corp., New York and Chicago. Price $1.50.

FATIGUE OF WORKERS—By Committee on Work in Industry of the National Research Council. 165 pp. Reinhold Publishing Corp., 330 West 42nd St., New York. Price $2.50.

UNIVERSITY OF PENNSYLVANIA BICENTENNIAL CONFERENCE—Fluid Mechanics and Statistical Methods in Engineering. 146 pp. University of Pennsylvania Press, Philadelphia. Price $1.75.

ROADS AND ROAD CONSTRUCTION YEAR BOOK AND DIRECTORY 1941–42. The Carriers Publishing Co., 1 Bridge Place, Belgrave Road, London, S. W. 1, England. Price 10/6.

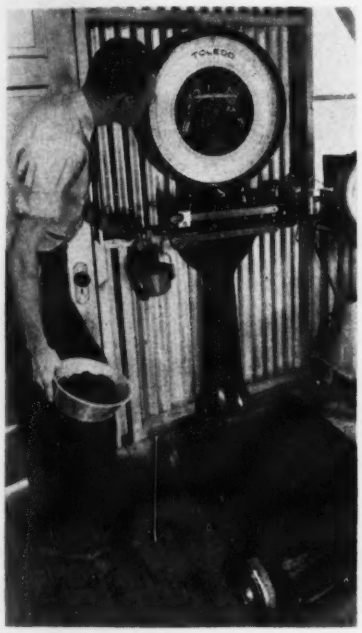
STRENGTH OF MATERIALS — By John W. Breneman. The Pennsylvania State Col-

(Continued on p. 146)

New Materials and Equipment for Building Construction

Moisture Meter Scale

1. For determination of moisture content in fine and coarse aggregate, the Scientific Concrete Service Corp. has announced a revised (SC)[2] scale using 4-lb. samples as compared with the 2 lb. samples formerly used. The larger sample increases the accuracy of the determination and is more convenient in the use of coarse aggregate. In use, after making a setting to represent the specific gravity of the aggregate, the damp material is run into the sample bucket (see illustration) until the scale pointer reaches this target. The bucket is then filled with



water, rolling to remove trapped air, and replaced on the scale which gives a direct reading of moisture content in percent. This reading is stated to be accurate to ¼ of 1 percent and a determination can be completed in less than a minute. The scale is also graduated for making specific gravity determinations on 2-lb. samples which can be completed with direct readings in less than one minute. The moisture meter scale is part of the method used with batching scales equipped to compensate for moisture in all of the aggregate, compensation being automatic and based on the percentage of moisture determined by the moisture meter scale. Calculations, charts and tables are not required.

All (SC)[2] weighing equipment is made by the Toledo Scale Co.—*Scientific Concrete Service Corp., McLachlen Building, Washington, D. C.*

Insulating Blanket

2. Employing an improved cellulose fiber insulating material, the Cell-U-Blanket is available in ½-¾- and 1-in. thicknesses and six widths for insulating walls, floors and roofs of all types of buildings. The blanket is available in

continuous rolls without joints and is covered with a waterproofed membrane which is fastened directly to the supporting timber members sealing the edges of the installation. The material is treated against termites, molding, and is flameproofed. Easy application is made by stapling the covering of the blanket direct to studs or rafters.—*Masonite Corp., 111 W. Washington St., Chicago.*

Floor Finishers

3. Designed to improve the finish on mastic floors, the Flexrock electric float

permits drier mixes and finishes the surface to a more durable finish at a faster rate with less labor required. A supplemental piece of equipment is the Flexrock grid tamp designed to bury large size aggregates and bring fines to the top of the concrete, providing a smoother finish and the use of a drier mix of concrete. The two pieces of equipment are announced as the answer to a demand for greater speed and finishing quality for industrial floors.—*Flexrock Co., 23rd and Manning Sts., Philadelphia, Pa.*

Calking Gun

4. Calking is simplified by the use of the Pecora high pressure gun for handling plastic materials. This cartridge gun is claimed to be a distinct advance in design, construction and performance consisting of a strong frame which encloses the operating mechanism and a cartridge loaded with the calking-compound. This cartridge, which is inserted in the frame, functions as the barrel of the gun. The cartridges are filled and sealed by the manufacturer at

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the factory to insure proper conditions when they are replaced in the gun with minimum time loss. The gun is claimed as saving almost half of the operator's time using other forms of equipment and to conserve material used.—*Pecora Paint Co., 3501 North Fourth St., Philadelphia, Pa.*

Metal Tie Wire

5. For use in moist or corrosive locations, the Everdur tie wire has been developed as a high strength alloy composed of copper silicon and other control elements which are claimed to provide a strength equal to that of mild steel. This wire is designed for use in lashing furring members to framing members and to tie metal lath to the steel framing or join the lath together. Wire is furnished in 25 lb. coils in from No. 14 to 18 gage. Minimum tensile strength of the wire is stated to be 65,000 lb. per sq. in.—*The American Brass Co., New York, N. Y.*

Lead for Roofing and Flashing

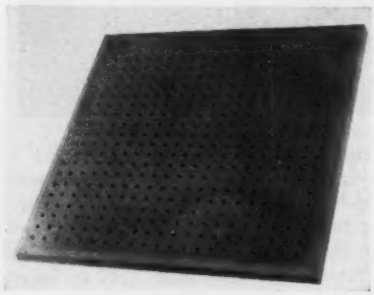
6. A new sheet lead roofing material—Roofloy—consists of pure pig lead strengthened by the addition of calcium, magnesium and tin, to improve mechanical properties so that the material can be rolled to thinner sheets for roofing and other building applications. The material retains the resistance to corrosion and the weathering quality of lead and the greater strength of the alloy permits its use in lighter weights. A particular characteristic of Roofloy is stated to be its high resistance to creep.—*Revere Copper and Brass Inc., 230 Park Ave., New York City.*

Rock Wool Blanket

7. Mineral wool insulating blankets are available in standard widths to fit 16 in. building frames and in three thicknesses. The material is stated to have a conductivity of 0.27 B.t.u. per hour per square foot per degree of temperature per inch and is encased in a waterproofed membrane paper. The material is fireproof. The mineral fiber will not rot or disintegrate and is non-settling. The insulation is designed for use in walls, roofs and ceilings as protection against the transmission of heat and cold and sound. —*The Barrett Co., 40 Rector St., New York City.*

Acoustical Material

8. A new acoustical material, stated to possess unusually high sound-absorbing characteristics, is made of a fibrous composition called Cushiontone. The material has almost 500 deep perforations per square foot providing the sound absorbing character at standard frequencies. Three standard thicknesses (½, ⅝ and ⅞ in.) are available in standard size units of 12x12 in. or 12x24. Designed to be used in natural color, the material can be painted with any standard paint without loss of acoustical efficiency. It is non-reflecting and also acts as an insulating material, and its light weight requires no extra support before installation.—*Armstrong Cork Co., Lancaster, Pa.*



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Company ..... **Title** .....

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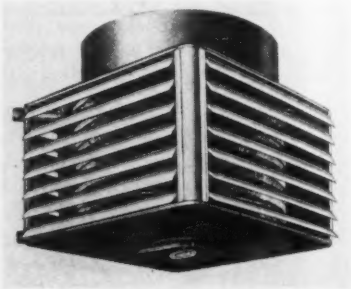
Ceiling Suspension Heater

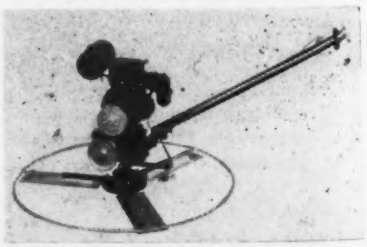
9. For heating installations in industrial or commercial buildings where quick and adequate supply of heat is essential, the Type 46S suspension unit is designed



for use with either steam or hot water. This heater of the Carrier Corp. is available in ten sizes ranging from 18,600 to 464,000 B.t.u. capacity. Features of the heater include the independent adjustment of the discharge louvres which are located on all four sides of the unit, permitting air to be discharged at angles varying from the vertical to the horizontal. The volume of air handled by the unit is sufficient to permit the use of any or all of the four side discharge openings and the unit is not more than 17 ft. above the floor elevation. For heights of 17 to 45 ft., two of the outlets are the maximum number recommended for use.—*Carrier Corp., Syracuse, N. Y.*

Self-contained Floor Finisher

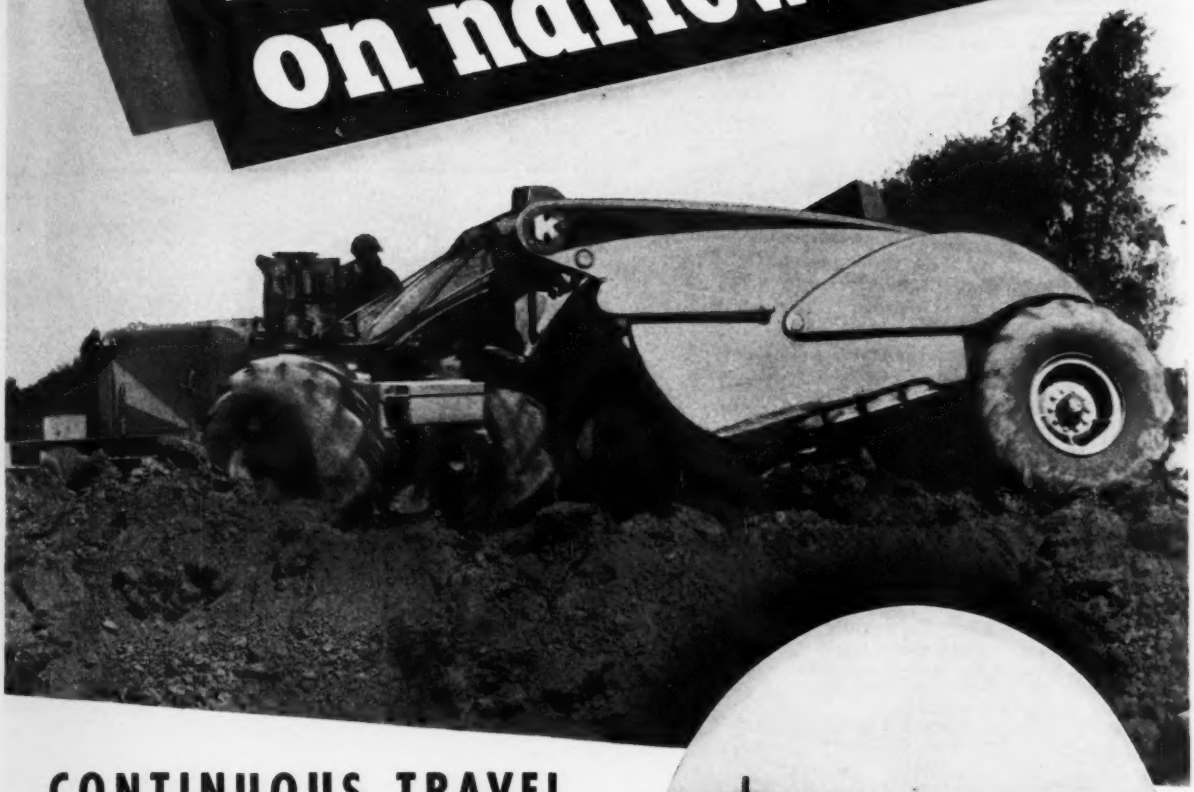
10. A gasoline engine driven model of the Whiteman concrete floor finisher is available which includes the features of the electrically driven unit. The advant-



age of the self-contained unit is for use where electric current is not available or convenient to the floor finishing job.

(*Continued on p.* 164)

SHORT TURNS on narrow fills



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HEAVY-DUTY CONSTRUCTION EQUIPMENT

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

SEWAGE PLANT ADDITIONS MIDDLETOWN, PA.

OWNER: War Department, U. S. Engineer Office, Baltimore, Md.

PROJECT: Construction of sanitary sewerage plant additions located near north bank of Susquehanna River at Middletown Air Depot, Olmsted Field, Middletown, Dauphin County, Pa. Includes construction of 6-in. and 8-in. sanitary sewers, manholes and pumping station No. 3 in shop area; 10-in. sewer from existing sewage treatment plant to pumping station No. 1, on land side of levee now under construction; construction of pumping station No. 1; 8-in. cast iron force main from pumping station No. 1 to new sewage treatment plant near Post Run; and a 300,000 gallon-per-day single stage biofilter sewage treatment plant between Post Run and access ramp to flood control pumping station now being built. All structures to be of reinforced concrete.

CONDITIONS: Contractor to furnish all materials and complete work in 120 calendar days. Rail and highway transportation facilities available. Wage rates specified as minimums are: skilled labor, 87½c. to $1.75 per hr.; semi-skilled, 50c. to $1.25; and common, 65c.

BIDS: Six bids were opened September 23, 1941, ranging from the low of $122,945 to $162,711. Engineer's estimate $100,090.

LIST OF BIDDERS:

1. Thomas M. Flanaghan, Reading, Pa. $122,945
2. The Gondos Co., Philadelphia, Pa. 126,695
3. E. H. Marhoefer, Jr., Co., Chicago, Ill. 144,800
4. Sordoni Constr. Co., Forty Fort, Pa. 146,425
5. Ritter Bros., Harrisburg, Pa. 151,000
6. Boyd H. Kline, Bloomsburg, Pa. 162,711

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Diversion, care of water and sewage	L. S.	$3,500.00	$10,000.00	$4,500.00
2. Stripping	1,600 c. y.	.25	.30	.30
3. Common excavation	1,600 c. y.	1.60	1.20	1.25
4. Structure excavation	430 c. y.	5.50	5.00	5.00
5. Rock excavation	40 c. y.	8.00	8.00	7.00
6. Trench excav. and bkfill. for sewers in shop area	1,900 c. y.	3.00	2.00	5.00
7. As above, for 8-in. c. i. force main	1,800 c. y.	1.00	2.00	4.00
8. As above, at treatment plt. site	450 c. y.	1.50	2.00	4.00
9. As above, for 2-in. water-supply line	300 c. y.	1.25	2.00	2.50
10. Lumber, left in place	35 Mbm.	50.00	40.00	40.00
11. Earth backfill at structures	800 c. y.	1.20	.75	1.50
12. Earth fill	1,700 c. y.	.60	1.10	.80
13. Top soil	800 c. y.	1.20	1.00	2.25
14. Gravel surfacing	90 c. y.	4.50	6.00	3.50
15. Concrete	650 c. y.	35.00	32.00	33.00
16. Reinforcing steel	90,000 lb.	.07	.065	.07
17. Misc. iron and steel	10,000 lb.	.22	.13	.20
18. Fence, complete	L. S.	2,000.00	1,500.00	1,728.00
19. Std. manhole, to 4-ft. depth, incl. c. i. frame and cover, steps and bottom	14 ea.	80.00	75.00	76.00
20. Each add'l. vertical foot in depth of manhole in excess of 4-ft.	55 l. f.	8.00	10.00	10.00
21. 6-in. vitr. clay pipe	1,900 l. f.	.40	.90	.60
22. 8-in. vitr. clay pipe	2,000 l. f.	.60	1.20	.75
23. 10-in. vitr. clay pipe	600 l. f.	.90	1.75	1.00
24. Cut and remove concrete	80 c. y.	5.00	6.00	20.00
25. Conc. repaving and cradles	60 c. y.	17.00	22.00	25.00
26. Cleanouts	5 ea.	15.00	20.00	40.00
27. 8-in. cast iron force main	4,600 l. f.	2.25	2.20	2.60
28. 2-in. water supply line	1,500 l. f.	.60	.70	.70
29. Raw sewage and recirculating pumps and motors, incl. controls	L. S.	3,200.00	3,120.00	3,600.00
30. Sludge pump and controls	L. S.	750.00	740.00	711.00
31. Comminuting mechanism	L. S.	2,300.00	2,100.00	1,971.00
32. Furn. and inst. all valves	L. S.	4,000.00	3,500.00	6,400.00
33. All cast iron pipe and fittings, furnish and lay	L. S.	6,500.00	5,650.00	11,500.00
34. Primary clarifier equipment	L. S.	4,000.00	3,830.00	3,567.00
35. Secondary clarifier equipment	L. S.	3,700.00	3,680.00	3,389.00
36. Biofilter rotary distributor	L. S.	2,000.00	1,900.00	1,800.00
37. Sludge digester equipment	L. S.	4,200.00	4,420.00	3,781.00
38. Automatic chlorinator	L. S.	4,400.00	4,150.00	4,700.00
39. Flow recorder	L. S.	550.00	525.00	750.00
40. Plumbing, complete	L. S.	850.00	1,200.00	3,100.00
41. Sludge beds	L. S.	1,375.00	1,270.00	2,100.00
42. Biofilter stone, tile and vents	L. S.	1,500.00	2,100.00	1,904.00
43. Electrical work, complete	L. S.	9,450.00	8,300.00	6,800.00
44. Heating and ventilating work	L. S.	275.00	320.00	350.00
45. Abandonment of existing sewage disposal plant	L. S.	600.00	1,000.00	800.00
46. Doors, windows and screens	L. S.	450.00	630.00	900.00

PUMPING PLANT OREGON-CALIFORNIA

OWNER: Bureau of Reclamation, Modoc Unit, Tule Lake Division, Klamath Project, Oregon-California, Klamath Falls, Ore.

PROJECT: Construction of pumping plant "D", Modoc Unit, Tule Lake Division, Klamath Project. Work is located about 23 miles southeast of Klamath Falls, Ore. Pumping units, sump pump, priming pump, exposed pipe for pumps, electrical apparatus, and steel motor-support beams with sole plates in pumping plant to be furnished and installed by Government. All anchor bolts and embedded fastenings for anchoring apparatus will be placed by contractor when concrete is placed. All piping for plumbing system and all other embedded piping to be placed by contractor.

CONDITIONS: Contractor to furnish all form materials, except absorptive form lining; oil; wire, wire ties; all temporary supports; sawdust for nailing concrete; broken rock or gravel; water; waterproof covering for bonded concrete floor finish; and all other materials not part of completed structure needed for completion of contract. Railway transportation available to Tule Lake, and highway facilities available at site of work. Time for completion 150 calendar days. Wage rates specified as minimums are: skilled labor, $1.00 to $1.50 per hr.; semi-skilled, 62½c. to $1.00; and common, 62½c.

BIDS: Four bids were opened August 25, 1941, ranging from the contract low of $37,232 to $67,826.

LIST OF BIDDERS:

1. John Gardner, Klamath Falls, Ore. $37,232
2. Scheumann & Johnson, Funella, Calif. 40,625
3. DeLuca & Sons, Inc., San Francisco, Calif. 61,219
4. River Bend Sand & Gravel Co., Salem, Ore. 67,826

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation, common	2,800 c. y.	$1.00	$2.00	$1.12
2. Excavation, rock	500 c. y.	2.00	3.00	7.11
3. Backfill	1,800 c. y.	.50	.50	.51
4. Compacting backfill	650 c. y.	1.00	1.00	.77
5. Gravel bed for sew. disp. field	90 c. y.	3.00	5.00	7.43
6. Conc.; substruct. of pump house	410 c. y.	28.00	25.00	33.91
7. Conc.; superstruct. of pump house	130 c. y.	28.00	35.00	73.09
8. Conc.; except in pump house	300 c. y.	28.00	35.00	64.29
9. Placing reinforcement bars	121,000 lb.	.04	.02	.03
10. Construct control joints	65 l. f.	1.00	1.00	12.28
11. Place metal sealing strips	50 l. f.	.50	1.00	4.80
12. Place rubber water stops	500 l. f.	.50	.50	.72
13. Dampproofing walls of pump house	125 s. y.	1.00	1.00	2.64
14. Place bonded concrete floor finish	65 s. y.	2.00	1.00	4.67
15. Place asphalt-saturated felt roofing, complete with flashing	900 s. f.	.20	.10	.33
16. Inst. wood door frames, doors and trim	190 s. f.	1.00	.50	1.79
17. Install metal sash windows	180 s. f.	1.00	.50	.43
18. Install metal louvers	100 s. f.	1.00	.50	.84
19. Lay 4-in. sewer pipe	100 l. f.	.40	.50	.50
20. Inst. trashrack and stop-log metal-work and stop-plank guides	9,000 lb.	.04	.03	.03
21. Inst. plate-steel discharge pipes	7,000 lb.	.04	.03	.04
22. Install flap gates	3,300 lb.	.04	.05	.03
23. Inst. traveling crane and crane rails	6,000 lb.	.04	.06	.04
24. Inst. metal floor plates, gratings, frames and hatchway, manholes, frames and covers	4,000 lb.	.04	.06	.06
25. Inst. metal pipe, fittings, valves; except pipe handrails	3,000 lb.	.04	.15	.19
26. Install miscel. metalwork	1,500 lb.	.20	.25	.40
27. Inst. electr. metal conduit, to 1-in.	850 l. f.	.20	.50	.50
28. Inst. electr. met. conduit, 1 to 2-in.	300 l. f.	.25	.50	.60
29. Inst. electr. non-metallic conduit	50 l. f.	.20	1.00	.10
30. Installing ground wires	600 lb.	.20	.30	.40

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OR REHANDLING

FOR DIGGING

★ FOR CONCRETE

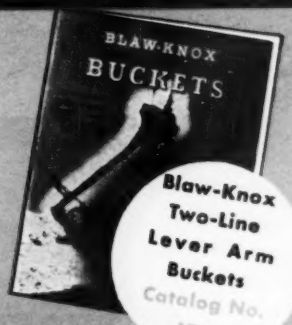
Blaw-Knox, the most progressive designer and manufacturer of clamshell buckets . . . offers bucket users the widest possible range of types and capacities in buckets specialized in application for the job.

Blaw-Knox Bucket Catalogs convey complete information and contain tables showing dimensions and capacities, as well as illustrations of applications and details of design.

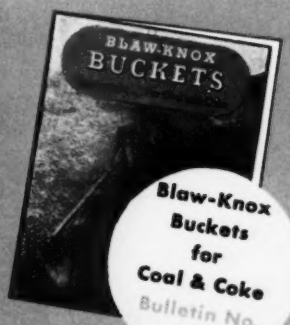
These catalogs show how to select the right bucket for the work.

Any or all of these Blaw-Knox Bucket Catalogs will be sent to you upon request. Write, or use the convenient coupon below.

Blaw-Knox builds clamshell buckets in a wide range of capacities for all classes of work—dredging, ore handling, steel mill service, etc. Your inquiries are solicited.

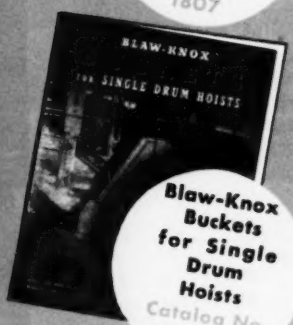


Blaw-Knox Two-Line Lever Arm Buckets
Catalog No. 1757



Blaw-Knox Buckets for Coal & Coke
Bulletin No. 1807

Blaw-Knox Clean-up Buckets for Barge Unloading
Bulletin No. 1694

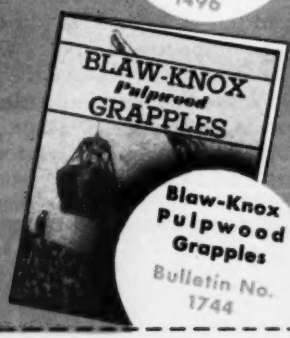


Blaw-Knox Buckets for Single Drum Hoists
Catalog No. 1696

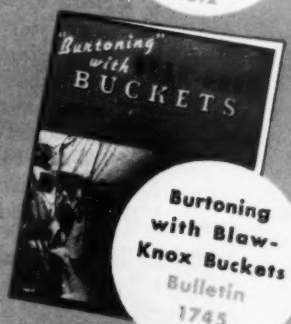
Blaw-Knox CONCRETE BUCKETS
Catalog No. 1816

Blaw-Knox Buckets (4 Rope) for Bridge Type Cranes
Bulletin No. 1496

Blaw-Knox Buckets for FERTILIZER and CHEMICAL Plants
Bulletin No. 1812



Blaw-Knox Pulpwood Grapples
Bulletin No. 1744



Burtoning with Blaw-Knox Buckets
Bulletin 1745

LAW-KNOX CONSTRUCTION EQUIPMENT Includes:

. . . and Batchers . . . Road Forms . . . Street . . . Concrete Spreaders . . . Tamping . . . Vibrators . . . Concrete Buckets . . . Clamshell Buckets . . . Truck Mixers . . . . . Mixing Machines . . . Turntables . . . Road . . . Batchers . . . Steel Forms . . .

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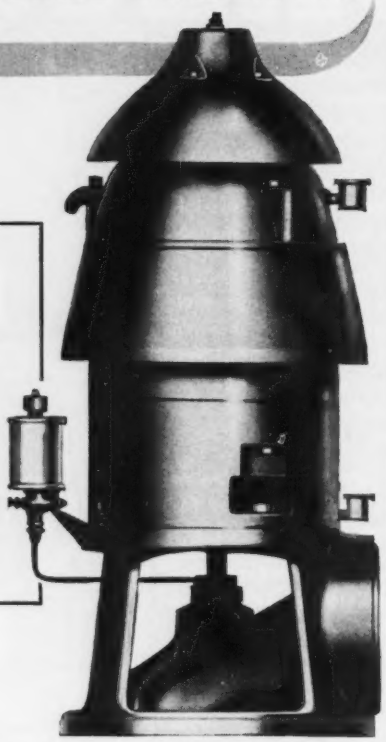

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Complete range of capacities (35 g.p.m. to 4000 g.p.m.) for electric motor, Diesel or gasoline engine, or steam turbine drive. Open or closed impellers, oil or water lubrication. Today's 6" F-M Turbine is *23% more efficient* than the same size was in 1927; today's 10" turbine is *21% more efficient* than the 10" pump was in 1927!

IF YOUR pumps are not of the latest, improved designs, they are probably wasting power which you could use profitably to increase plant capacity.

Ten-year-old pumps of certain types, even if as good as new, take a 25% greater toll at the power meter than today's Fairbanks-Morse models. And 3- or 4-year-old pumps of other types consume so much more power than current models that continued use is not only more costly than replacement, but is intolerable because it dissipates vitally needed power resources.

Before arranging for increased power supply, take every practical step to eliminate power waste. A Fairbanks-Morse Pump Engineer can tell you quickly, without cost or obligation, whether your pumps are the types which waste power . . . which carry such heavy obsolescence penalties that new pumps would pay for themselves in as little as a year. Find out now. Write Fairbanks, Morse & Co., Dept. J29, 600 S. Michigan Ave., Chicago, Ill. Branches and service stations throughout the United States and Canada.

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Pumps

New Engineering Books

(*Continued from p.* 140)

lege Industrial Series. 145 pp. McGraw-Hill Book Co., New York and London. Price $1.50.

INTRODUCTION TO METEOROLOGY—By Sverre Petterssen. 236 pp. McGraw-Hill Book Co., New York and London. Price $2.50.

MANAGEMENT AND MORALE—By F. J. Roethlisberger. 194 pp. Harvard University Press, Cambridge, Mass. Price $2.

TESTING AND INSPECTION OF ENGINEERING MATERIALS—By Harmer E. Davis, George Earl Troxwell and Clement T. Wiskocil. 372 pp. McGraw-Hill Book Co., New York and London. Price $3.50.

MATERIALS TESTING—By Herbert J. Gilkey, Glenn Murphy and Elmer O. Bergman. 185 pp. McGraw-Hill Book Co., New York and London. Price $2.75.

Reports and Pamphlets

SCHEDULE OF MINIMUM ENGINEERING FEES AND SALARIES—The Ohio Society of Professional Engineers, 63 S. High St., Columbus, Ohio. Price 10c.

A FIELD INVESTIGATION OF LOW-COST STABILIZED ROADS—Research Series No. 81. Engineering Experiment Station, Lafayette, Ind. Price 35c.

BITUMINOUS SURFACE TREATMENT — Research Series No. 82. Engineering Experiment Station, Lafayette, Ind. Price 35c.

CONTROL OF WELDING HAZARDS IN DEFENSE INDUSTRIES—Special Bulletin No. 5. U. S. Dept. of Labor, Division of Labor Standards, Washington, D. C.

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS — Proceedings of 21st Annual Meeting, 1940–1941. 503 Carolina Life Bldg., Columbia, S. C.

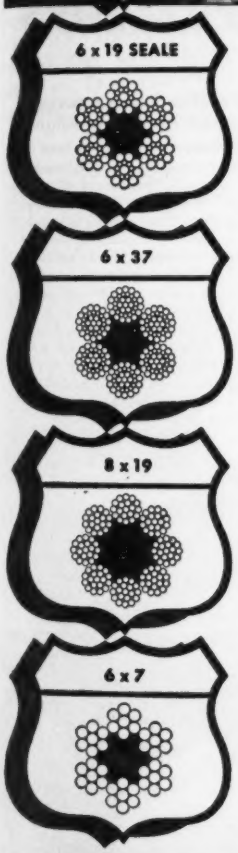
EFFECTS OF THE DEFENSE PROGRAM ON PRICES, WAGES, AND PROFITS—The Brookings Institution, Washington, D. C. Price 25c.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.—Annual Report for the year ending 1941. The Institute, 101 Park Ave., New York.

PROVA DE CARGA DA PONTE DA CIADADE JARDIM sobre o canal do rio Pinheiros. Separata do Boletim do Departamento de Estradas de Rodagem, Sao Paulo, Brasil.

CALIFORNIA WATER SUPPLY STATISTICS—Special Bulletin No. 63. Dept. of Public Health, Sacramento, Calif.

(*Continued on p.* 148)



. . . And there is One Best Construction and Type of Wire Rope for each and every Use

OF NECESSITY, all wire ropes do not operate under the same working conditions. Where small drums and sheaves are unavoidable, extra flexibility is necessary; where ropes are subjected to excessive surface wear, the outer wires should be relatively large; some ropes are required to handle extra heavy loads, others must work at high speeds, and there are many uses where a combination of severe conditions is encountered.

Maximum wire rope efficiency is obtained only when the rope used is of the type, grade and construction best suited to the particular conditions under which it is to work. In order to meet the numerous requirements, wire rope is made in a wide range of constructions, as well as in many different grades and in both Standard and Preformed types.

If you are not getting satisfactory wire rope results, it may be that you are not using the rope most suitable for your equipment. Ability to make proper selection comes with experience, so do not hesitate to call on wire rope manufacturers for the benefit of their research work.

Under present emergency conditions, the importance of using the right rope—as well as the importance of adopting all other means and methods of increasing efficiency—cannot be over-emphasized. This is neither the time nor the place for detours; instead, it is imperative that we travel the road that gets us to our desired destination in the shortest time possible.

This advertisement is published for the purpose of helping all wire rope users speed up their work, and at the same time obtain more economical service from their wire rope. Our experienced engineers will gladly help you solve any wire rope problem that may be giving you trouble.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

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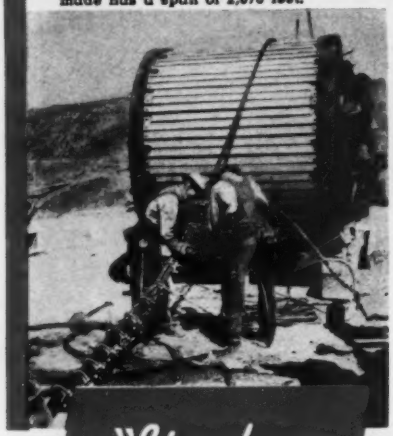
Riggers applying Genuine CROSBY CLIPS to a 1¼ inch messenger line preparatory to stringing the 3-inch "main gut" which is still coiled on the unopened reel shown in the picture. The cableway that was about to be strung when this picture was made has a span of 2,670 feet.



"You know CROSBY CLIPS will hold SAFELY....

. . . . BECAUSE THEY'VE BEEN DOING IT FOR 58 YEARS."

Yes, experienced riggers agree that there is one wire rope fastening you can bank on, and that is the

Genuine CROSBY CLIP

It is only logical to use steel clips to fasten modern steel ropes; the base of the Genuine CROSBY CLIP is a solid steel forging. The design has been worked out so that most metal is put where the greatest stresses fall. Over-size U-bolt and nuts; perfect finish all over. Heavily armored with zinc by the hot dip process.

Why run any risk? Standardize on Genuine CROSBY CLIPS.

Dealers with full stocks in all principal cities.

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AMERICAN TERRY DERRICK CO., SOUTH KEARNY, N. J.

Reports and Pamphlets

(*Continued from p. 146*)

MUNICIPAL ZONING IN BERGEN COUNTY—Its Status, Quality and Extension. County Planning Board, Hackensack, N. J.

SPRINGFIELD, MASS.—67th Annual Report of the Water Commissioners, 1940.

SOMERVILLE, MASS.—Annual Report of the City Engineer, 1940.

YOUR CITY GOVERNMENT—Schenectady, N. Y. 1940.

HUTCHINSON RIVER PARKWAY EXTENSION—Triborough Bridge Authority, New York City.

PARK AND PARKWAY and a Program for Future Regional Expansion—Bulletin Number 56, Regional Plan Association, Inc., 400 Madison Ave., New York.

ASPHALT SURFACE TREATMENT or Retreatment of Old Bituminous Surfaces—Construction Specifications S-1 (Revised Sept. 1, 1941). Asphalt Institute, 801 Second Ave., New York.

ASPHALTIC ROAD MIX SURFACE COURSE—Construction Specifications R. M. -1 (Revised Sept. 1, 1941). Asphalt Institute, 801 Second Ave., New York.

ASPHALTIC ROAD MIX SURFACE COURSE—Construction Specifications R. M. -2. (Revised Sept. 1, 1941). Asphalt Institute, 801 Second Ave., New York.

COLORADO—Department of Water Resources, 30th Biennial Report of the State Engineer to the Governor of Colorado, 1939-1940.

PROCEEDINGS—23rd Texas Water Works and Sewage Short School—Texas A&M College, College Station, Texas.

OUR CITY—Rochester, N. Y. 3rd Annual Municipal Report, 1940.

TENNESSEE VALLEY AUTHORITY—Report of the Chief Engineer, 1941, Knoxville, Tenn.

COMPARATIVE STUDY of Performances of the Municipal Sewage Treatment Plants Incorporating Application of Chemicals at Wilmington and Lebanon, Ohio—Ohio Dept. of Health, Columbus, Ohio.

DIE BEWEGLICHKEIT DER BEWEHRUNG IM BETON UND DER HAFTWIDERSTAND—Verlag Von Wilhelm Ernst & Sohn, Berlin.

ANNUAL HIGHWAY CONFERENCE, University of Michigan (Ann Arbor, Mich.). Proceedings of the 27th Annual Conference.

HEAVY DUTY FLOORING AND ROOF DECKING—Copies available from the Southern Pine Association, Canal Bldg., New Orleans, La.

"Going Good

and making GOOD MONEY for us", says W. C. White & Son, Dayton, Ohio about their two

SMITH AIR COMPRESSORS

RIGHT NOW, think of the savings you'll enjoy with these lightweight, sturdy compressors! BIG savings in purchase cost over standard compressors of equal capacity . . important savings on upkeep too! Made with FORD Motors and standard parts. That means dependability and economy. Repairs and parts at Ford garages everywhere. . . In service, 60 cu. ft. size Smith Compressors use only 1 gal. of gasoline an hour! Easily portable tow them from job to job at permissible truck speeds. No couplings, belt, clutch or gears to wear and give trouble. Head equipped with high speed compressor valves; automatic unloading and idling. . . Write today for complete catalog that gives you the facts!

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SOME BLOW!

New And Faster, Here's The Hardest-Hitting Portable Electric Hammer That Ever Pounded Concrete—The "Thor-Nado", With Its Amazing "Sling Shot" Drive and Heavy Duty Motor

Since Thor introduced the THOR-NADO just 18 months ago, more than 3 thousand construction and maintenance men have decided they were fed up with weak-sister portable electric hammers. They saw the THOR-NADO in action . . . saw its smashing blow . . . its handling ease . . . its sturdy build — and today they count their gains in the hours and dollars they save with *their* THOR-NADO.

So ask some of these THOR-NADO users what a THOR-NADO can do for *you* in hole drilling, demolition, channeling, cutting, chipping and scores of other jobs in stone, wood and metal.

You'll hear about the speed with which the THOR-NADO puts a star drill through stone or knocks out a brick wall. That's because of Thor's special heavy duty motor that powers a blow more smashing than any hammer of comparable size and capacity.

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Then *try* a THOR-NADO and see for yourself why it saves money, time and energy. Your Thor Distributor has them . . . look him up today.

Fast! Light! Powerful!

SIZE NO. U-100
Capacity .....1" Star Drill
Weight...14 lbs. Length...13½"
Blows per Minute 1600
AC/DC Universal motor in 110, 220 or special voltages.
Furnished with steel carrying case and complete equipment.

Sling Shot Drive

The Thor-Nado's tremendous power and stamina is largely due to the ingenious new "Sling-Shot" Drive — a shock-proof rubber connection that whips the piston back and forth 1600 times per minute, acting as both power accumulator and shock absorber. With no metal connection between them, the piston blow is not transmitted to gears or motor.

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Full Capacity . . . applied to MORRIS . . . has a two-fold meaning these days.

MORRIS Pumps give full capacity . . . at full efficiency . . . for long periods even on severe services . . . a fact that can be attested by engineers on hydraulic dredges, in sand and gravel plants, on contracting jobs, in industrial plants and in municipal pumping stations all over the country.

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MEETINGS

AMERICAN PUBLIC WORKS ASSOCIATION, 47th annual conference, Roosevelt Hotel, New Orleans, La., Oct. 26-29, 1941.

NATIONAL COUNCIL STATE BOARDS OF ENGINEERING EXAMINERS, Hotel Pennsylvania, New York, N. Y., Oct. 27-30.

INDUSTRIAL HYGIENE FOUNDATION, 6th annual meeting, Mellon Institute, Pittsburgh, Pa., Nov. 12-13.

NATIONAL RIVERS AND HARBORS CONGRESS, Miami, Fla., Nov. 13-14.

HIGHWAY RESEARCH BOARD, 21st annual meeting, Johns Hopkins University, Baltimore, Md., Dec. 2-5.

REGIONAL AND LOCAL MEETINGS

WATER POLLUTION CONFERENCE OF INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN, Philadelphia Section, American Society of Civil Engineers, and Engineers Club of Philadelphia, at the Engineers Club, 1317 Spruce St., Philadelphia, Oct. 24.

WATER AND SEWAGE WORKS CONFERENCE, 7th annual meeting, Aberdeen, S. D., Oct. 28-29, 1941.

ILLINOIS WATER PLANT OPERATIONS, 9th annual fall meeting, Leland Hotel, Springfield, Ill., Oct 28-29.

TEXAS SECTION, AM. SOC. OF C. E., fall meeting, Fort Worth, Oct. 31-Nov. 1.

AMERICAN SOCIETY OF CIVIL ENGINEERS, Mid-South Section, twelfth annual meeting, Vicksburg, Miss., Oct. 31-Nov. 1.

ENGINEERING SOCIETY OF WESTERN PENNSYLVANIA, annual conference, William Penn Hotel, Pittsburgh, Nov. 3-4.

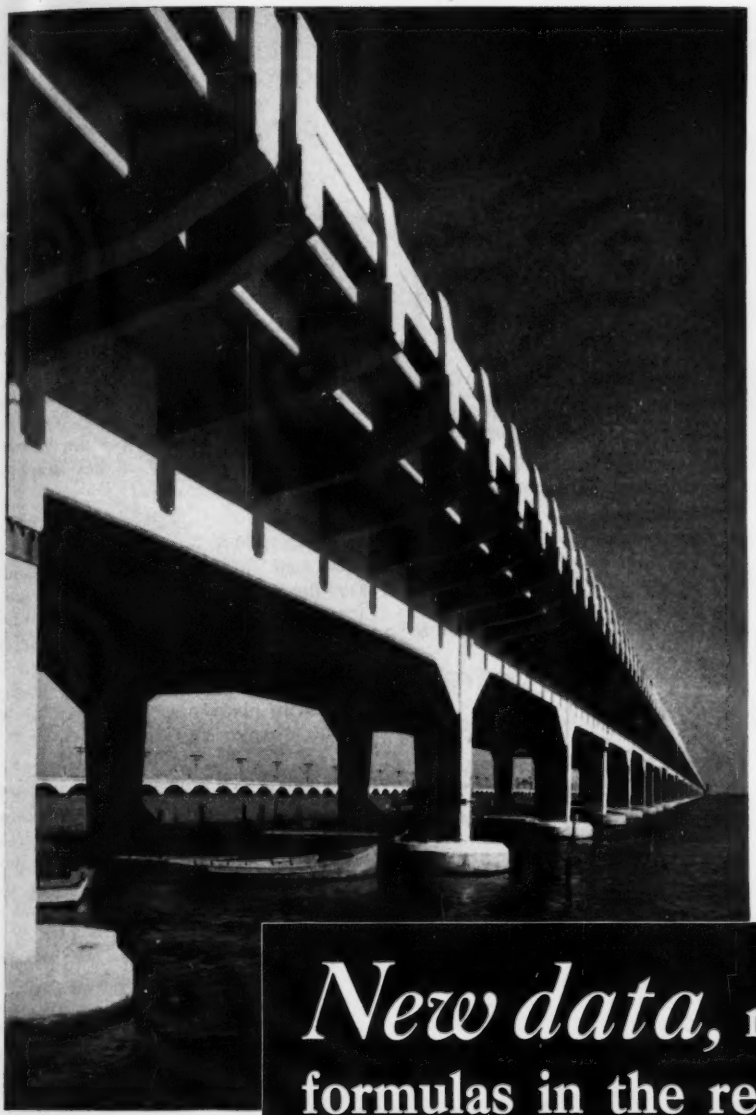
NORTH CAROLINA SECTION, American Water Works Association, High Point, N. C., Nov. 3-5.

ILLINOIS ASSOCIATION OF HIGHWAY ENGINEERS, 1941 convention, Abraham Lincoln Hotel, Springfield, Ill., Nov. 9.

TENNESSEE VALLEY SECTION, Am. Soc. of C. E., full meeting, Knoxville, Tenn., Nov. 14–15.

ELECTIONS AND ACTIVITIES

WHEN the Alabama Chapter of the American Society of Safety Engineers met for its recent annual meeting, E. J. McCressin, chief of the Alabama state safety and inspection department, was chosen general chairman. He succeeds Hubert Mills, secretary-treasurer of the Alabama Mining Institute. J. O. Speed,



The Galveston Causeway at Galveston, Texas, has 39 three-span continuous concrete girder units each 201½ ft. long. Total length, 8,200 ft.; 40-ft. roadway; two 30-in. sidewalks. G. G. Wickline, bridge engineer for the State Highway Commission. Terrell Bartlett of San Antonio, consulting engineer. Austin Bridge Co. of Dallas, contractor.

New data, new time-saving formulas in the revised edition of CONTINUOUS CONCRETE BRIDGES

The original edition of *"Continuous Concrete Bridges"* marked a big advance in simplifying office design practice for engineers applying the principle of continuity to the design of continuous T-girder and slab bridges.

Now, this newly revised edition presents another important advance—*a simple, quick method for computing the deflection of continuous bridges*—a great time-saver for the designing engineer.

Thanks to concrete's adaptability to continuous design, the use of this highly efficient type of bridge has increased rapidly. Continuous concrete bridges offer good appearance, long life and a wide range of span lengths. There is a type suitable for almost any site.

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Decaying lumber can long go unnoticed in commercial buildings. Expensive, disastrous failures may result.

Guard against such hazards by building with Wolmanized Lumber. It is proof against decay and termite attack; made that way by scientifically controlled, vacuum-pressure impregnation with Wolman Salts* preservative. It is easy to handle and erect, clean, odorless and paintable.

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Examination of millions of feet of Wolmanized Lumber, in service for years under conditions favorable for decay, has demonstrated the economy of using it. The booklet, "Service Records for Wolmanized Lumber," reporting on these installations, is available to you on request. For this and other data on Wolmanized Lumber, write American Lumber & Treating Company, 1649 McCormick Building, Chicago, Illinois.

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WOLMANIZED LUMBER

Alabama Power Co., was chosen vice chairman, and J. M. Fallen, American Cast Iron Pipe Co., secretary-treasurer. A. M. Witt, C. E. Saxen and W. T. Burgess were elected members-at-large for the executive committee.

IN ALL, 163 engineers and traffic men representing 13 states and the District of Columbia were present for the First Southeastern Traffic Engineering Conference. The meeting was sponsored by the South Carolina State Highway Department and Clemson College. J. S. Williamson, chief highway commissioner of the South Carolina state highway department and president of the American Association of State Highway Officials, presided. So successful was the meeting that a similar conference has been decided upon for next year.

ABOUT 200 Ohio sewage plant operators and engineers were in attendance for the two-day conference on sewage treatment practices held recently at Mansfield, Ohio. Ben H. Barton, Findlay, Ohio, was chairman. J. R. Turner, superintendent of the Mansfield sewage treatment plant, was in charge of inspection of that city's plant.

A NATIONAL DEFENSE ORGANIZATION known as Associated Defense Committee has been organized by a group of technical societies in Chicago with the purpose of stimulating thought upon the subject among the interested professional men. The plan is to provide a small forum for the discussion of new ideas and to bring promising suggestions to the notice of the appropriate government agencies. Leigh S. Keith, secretary of the Western Society of Engineers, is secretary of this new organization.

MARTIN S. FABIAN is the new president of the Jacksonville, Fla. Engineering Professions Club. Other new officers are: James U. Moorehead, vice president; Richard Lampp, secretary; David B. Lee, treasurer, and Earl Q. Martin, retiring president and now program director.

THE WISCONSIN County Highway Superintendents' and Foremen's Association at their second annual convention in Wausau, recently elected the following officers: Arthur Wolfe, Fountain City, president; A. W. Johnson, West Bend, vice president; and Ray Nadeau, Green Bay, secretary-treasurer.

FRANK S. MCFADEN is president of the Montgomery, Ala. Engineers Club, which now has a membership of about 200. It is reported that his club is seeking engineers for many positions now open, which is in contrast to past years when many

DEGREE OF SAFETY

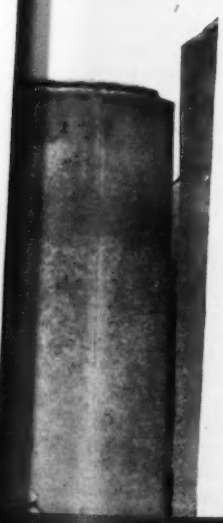
Into Your Pipe Lines

In this emergency, and as a matter of defense, an ample and uninterrupted flow of water from reservoirs to factories, hospitals, hydrants, and homes becomes increasingly important.

When you are planning a new water system, we hope you will remember this . . . Lock Joint Reinforced Concrete Pressure Pipe offers a greater degree of safety against destruction by sabotage or shock.

Briefly, because of its greater wall thickness, its strong steel reinforcement, its elasticity, and its expansion joints, Lock Joint Pipe is better able to resist shock or movement.

Should the shock be so great as to cause considerable damage, even to the extent of cracking the structure, this pipe will continue to function as an effective water carrier.



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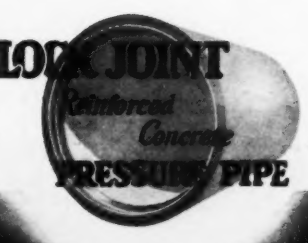

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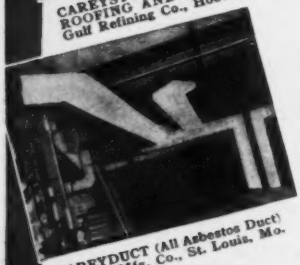
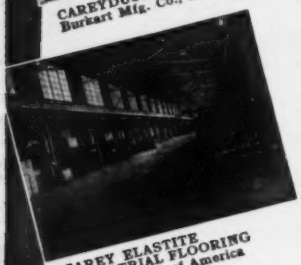
CONSERVE VITAL RESOURCES

BY USING PRODUCTS OF Carey RESEARCH

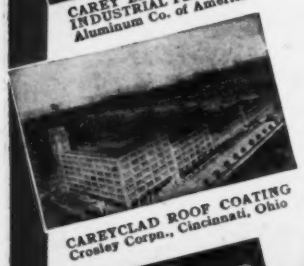
CAREYSTONE CORRUGATED ROOFING AND SIDING
Gulf Refining Co., Hooven, Ohio



CAREYDUCT (All Asbestos Duct)
Burkart Mfg. Co., St. Louis, Mo.



CAREY ELASTITE INDUSTRIAL FLOORING
Aluminum Co. of America



CAREYCLAD ROOF COATING
Crosley Corpn., Cincinnati, Ohio

CAREY HEAT INSULATIONS
Industrial Rayon Corpn.,
Painesville, Ohio

Numerous products developed by CAREY release resources needed for defense; this is important from a national viewpoint. Likewise, it has its advantages to industry, for experience has proved the superiority of CAREY materials in service and has demonstrated their ability to cut maintenance costs drastically.

Fireproof CAREYSTONE Roofing and Siding have definite advantages in permanence and low upkeep . . . CAREYDUCT, the all-asbestos prefabricated duct for air-conditioning systems, is superior to and costs about the same as insulated metal duct . . . CAREY ELASTITE Industrial Flooring provides a heavy-duty, long-wearing and resilient floor surface at relatively low cost . . . CAREYCLAD Roof Coating preserves the life of metal and Built-Up Roofs . . . CAREY HEAT INSULATIONS help conserve the nation's fuel supply.

Carey Rock Wool Insulation, Carey Built-Up Roofs, Careystone Wallboard, and other CAREY Products offer advantages in high efficiency and low upkeep.

If you contemplate plant expansion or improvement, our book, "Proved Protection against Wasted Profits," should be of interest. Write today, department 30.

CAREY ROCK WOOL
Florigold Citrus Corpn.,
Lake Alfred, Fla.

CAREY BUILT-UP ROOFS
Frankfort Distilleries,
Louisville, Kentucky

INDUSTRIAL BUILDING PRODUCTS OF
ASPHALT—ASBESTOS—MAGNESIA

Roofing . . . Siding . . . Flooring . . . Insulations . . . Roof Coatings and Cements
Waterproofing Materials . . . Expansion Joint . . . Asbestos Paper and Millboard

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Dependable Products Since 1873
IN CANADA: THE PHILIP CAREY COMPANY LTD., Office and Factory: LENNOXVILLE, P. Q.

(*Continued from p.* 152)

engineers were asking about positions available.

THE NEW PRESIDENT of the Tulsa, Okla. Engineers Club is Howard R. Auerswald, of the Gulf Oil Corp. Other new officers are: W. A. Leech, Jr., Koppers Co., executive vice president; R. E. Carter, entertainment head; W. R. Wooten, treasurer, and William J. Overton, secretary.

MEMBERS OF THE MONTANA Contractors Association, a unit of the Associated General Contractors of America, attended a summer business and social meeting at Diamond S. Ranch, Boulder, Mont., Aug. 20. The conference was addressed by H. E. Foreman, national managing director and by N. W. Watson, president of the General Contractors' Association. More than 150 members and associates of the Montana organization attended the meeting.

LEWIS ALAN BERNE, New York City, was re-elected as international president of the Federation of Architects, Engineers, Chemists and Technicians at the union's sixth national convention. Also re-elected were James A. Gaynor of New York, secretary-treasurer, and Marcel Scherer, vice president in charge of the organization. Other vice presidents chosen were Arthur Cox, Detroit; Henry Doren, Toledo; and Dave Adelson, Berkeley, Calif.

CONFERENCES

ANNUAL SWIMMING POOL CONFERENCE for Illinois operators, University of Illinois, Urbana, Ill., Oct. 31-Nov. 1. Meeting sponsored jointly by Illinois state department of public health and the university's school of physical education.

FIRST NATIONAL AIRPORT CONFERENCE, Palmer House, Chicago, Ill., Oct. 30-31. Sponsored by Illinois Institute of Technology.

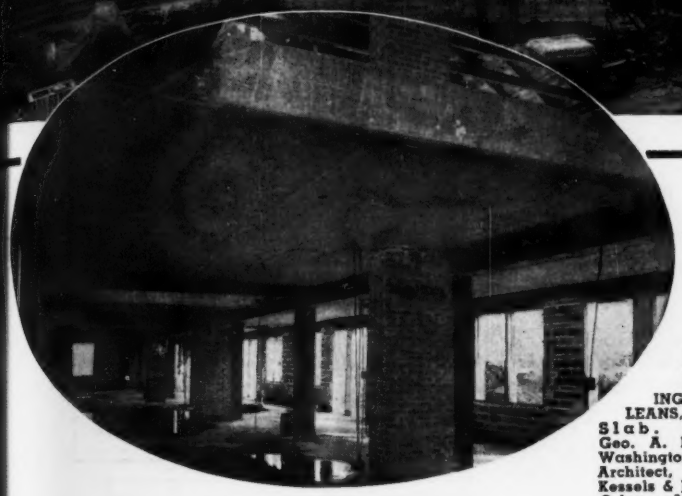
MEN AND JOBS

W. C. Brown, assistant county engineer of Travis County, Tex., has been granted a six months' leave of absence from that position to become general superintendent for Hunter Strain, contractor, of San Angelo, Tex., on airport improvement projects at San Angelo and Big Springs. Mr. Brown assumed his new duties Oct. 6.

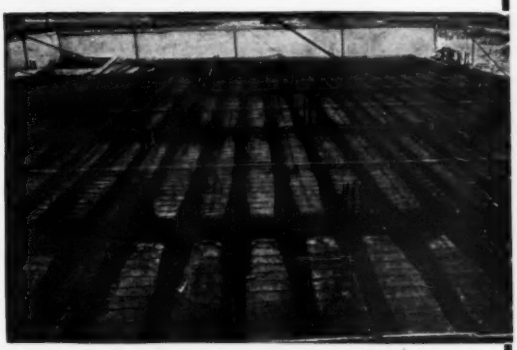
W. F. Campbell has joined the staff of the Aluminum Co. of Canada, Ltd., at

AUSMAN *Steel Form* SERVICES....

CHARLES ST. HOUSING, DETROIT, MICH. Solid Slab. Contractor, Consolidated Construction Co., Chicago, Ill. Architect, Michigan Housing Associates, Detroit, Mich.



Left—CALLIOPE ST. HOUSING, NEW ORLEANS, LA.—Solid Slab. Contractor, Geo. A. Fuller Co., Washington, D. C. Architect, Rosenthal, Kessels & Jones, New Orleans, La.



U. S. VETERANS HOSPITAL, LITTLE ROCK, ARK.—Ribbed Slab. Architect, Veterans Administration, Washington, D. C. Contractor, McGregor & Pickett, Little Rock, Ark.

. . . SAVE ON ALL CONCRETE FORM SETTING OPERATIONS

Hausman builds forms for solid slabs, ribbed slab forms, removable steel forms for all types of construction and adjustable round column molds for multi-story buildings . . . Hausman will estimate and contract for your concrete form setting operations . . . Hausman service will relieve the contractor of all form setting responsibility and provide a guaranteed cost for this work . . . Hausman experience in estimating form setting costs will save both time and money for the designing engineers and the contractor.

STALEY MANUFACTURING CO.—Column Mold. Contractor, J. L. Simmons Co., Decatur, Ill. Architect, Staley Manufacturing Co., Decatur, Ill.

The HAUSMAN STEEL Company

TOLEDO OHIO

WRITE for DATA SHEET—

DATA SHEET

...tives computed volumes ...d concrete in various ...izes of Circular Columns, Column Heads, Beams, Ribbed Slabs.

THE HAUSMAN STEEL COMPANY, Toledo, Ohio

Please mail this convenient and useful tabulation of data to save time in figuring concrete volumes.

NAME .....

COMPANY .....

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When Temperature Drops To

50°F.

WATCH YOUR CONCRETE!

Concrete mixes are designed for use at 70° F. When the temperature drops to 50 degrees or lower the development of strength is seriously retarded ***—concrete needs special attention.***

Federal, State, and other construction specifications call for the addition of Calcium Chloride to all concrete when the temperature is expected to drop to 50 degrees or lower during the 24 hours following the pouring. They have made tests and *know* that the addition of Calcium Chloride gives speed and assures designed strength even at lower temperatures.

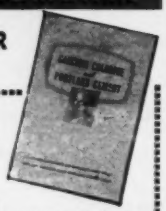
For complete FACTS, including charts, graphs, and figures from tests by the Nat. Bur. of Stds., P. C. A., A. R. B. A., and Highway Research Board, ask for our 48 page book.

9 ADVANTAGES

1. Reduced Costs
2. Quicker Set
3. High Early Strength
4. Greater Final Strength
5. Extra Cold Weather Protection
6. Uniform Dependable Curing
7. Shorter Protection Period
8. Less Forms and Equipment
9. Increased Density and Hardness

use SOLVAY CALCIUM CHLORIDE *with all* PORTLAND CEMENTS

MAIL COUPON FOR FREE COPY!



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Gentlemen: Kindly send me a free copy of your booklet "Calcium Chloride and Portland Cement."

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City ..... *State* 57-1041

Arvida, Que. He was previously road superintendent and county engineer for the county of Haldimand, Ont.

E. C. O'Leary is now field superintendent in charge of construction with Standard Paving Maritime Ltd. at Halifax, N. S. He is a civil engineer from the Nova Scotia Technical College, 1936.

C. L. Dufort is now registrar of the Corporation of Professional Engineers of Quebec, in Montreal. Mr. Dufort graduated in civil engineering from the Ecole Polytechnique of Montreal in 1905. Previously to his present position, he was chief engineer for the Colonization Department of the Province of Quebec.

C. P. Flemming is now engineer with the United Service Corporation, Ltd. at Halifax, N. S. He graduated in civil engineering from the Nova Scotia Technical College in 1937.

I. D. MacKenzie is now field engineer with the Shawinigan Engineering Co., Shawinigan Falls, Que. He is a bachelor of science from Queens University, 1940.

Paddy Baker, civil engineer with the South Dakota State Highway Commission for the past year, has accepted a position in the engineering department of Boeing Aircraft Corp. at Seattle, Washington.

Lorne B. Whiteway, who has been resident engineer with the Prince Edward Island Department of Public Works and Highways for the past three years, has accepted an appointment with R. C. A. F. Works and Buildings, as assistant engineer at No. 4 Repair Depot, Scoudeuc, N. B.

J. H. Ingham has joined the staff of Walter Kidde Co. of Canada at Montreal. A graduate of McGill University in 1935, he had been with the Dominion Bridge Co. as a mechanical designer and estimator.

Five 1941 civil engineering graduates of Iowa State College have recently gone to work on construction of a new set of locks at the Panama Canal. They are **Leo Cagley** of Waterloo; **Earnest McFerren,** Montezuma; **Walter Cords,** Elkader; **Kurt Hueftle,** Curtis, Neb.; and **Earl Anderson,** Sioux City.

W. R. Younge is now field engineer for the E. G. M. Cape & Co. Ltd., at St. Johns, Newfoundland. He graduated in civil engineering from the University of Manitoba in 1928.

Pennsylvania's Department of Highways has announced the appointment of **Thomas J. Graham,** of Madera, Pa., as

"BERG" EQUIPMENT FOR MANY APPLICATIONS

Model V2-AS Vibrator

Portable electric Surfacer — for surfacing concrete and cleaning sandstone buildings. One-man machine suspended from operator's shoulder.

Portable electric Water Feed Surfacer— for wet grinding.

Gasoline Heavy Duty Surfacer — for surfacing bridges, culverts, etc.

Electric Vibrator — for concrete vibrating.

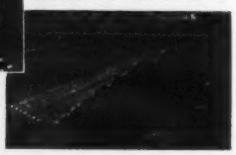
Gasoline Surfacer — for removing irregularities on highways.

Right Angle Heads and Right Angle Cylinder Heads for curved construction.

Have attachments for use on all models.

The CONCRETE SURFACING MACHINERY COMPANY
4667 Spring Grove Ave., Cincinnati, Ohio

KEEP YOUR CONVEYOR BELTS GOING



FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.

FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

● **Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco belt fasteners. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.**

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco. Also illustrates step by step the latest practice in repairing rips and putting in patches.

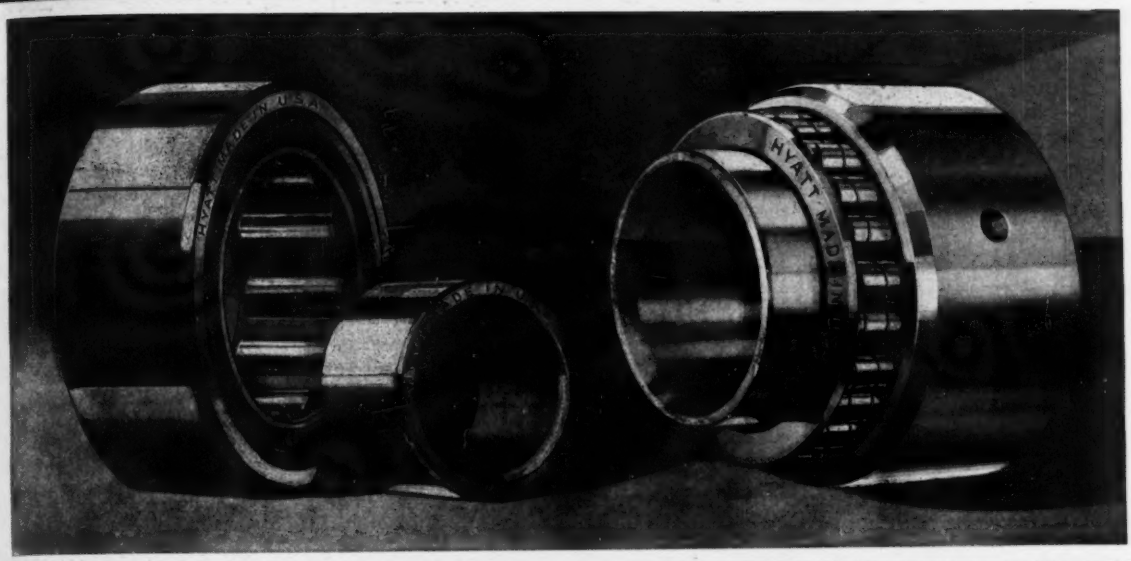
FLEXIBLE STEEL LACING CO.
4656 Lexington St., Chicago

Write for your copy.

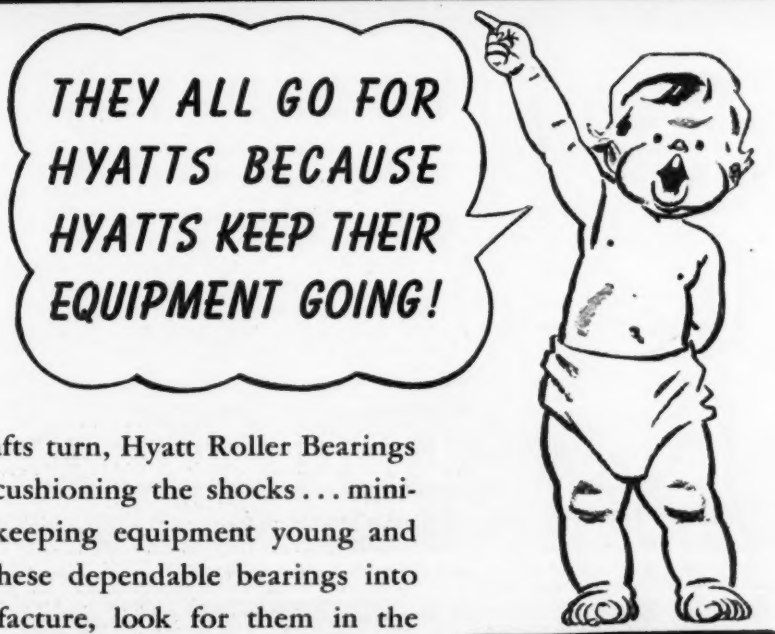
FLEXCO H D BELT FASTENERS

Sold by supply houses everywhere

KEEP THEM YOUNG WITH HYATTS



NO MATTER WHAT THE APPLICATION



Wherever wheels and shafts turn, Hyatt Roller Bearings are carrying the load . . . cushioning the shocks . . . minimizing friction . . . and keeping equipment young and ever on the go. Build these dependable bearings into the machines you manufacture, look for them in the equipment you buy, and let us give you any further data desired. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.

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ROLLER BEARINGS

QUIET

We are Seven!
LIDGERWOOD CABLEWAYS
on SHASTA DAM
For DAM and BRIDGE construction particularly in DEEP CANYONS the CABLEWAY has no equal as evidenced by the fact that a large MAJORITY of the notable DAMS in this country as well as many in foreign countries have been built or are being built by LIDGERWOOD CABLEWAYS.
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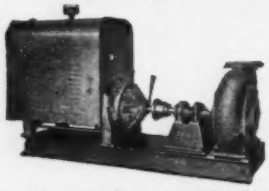
Close Coupled-Timken Bearings



Especially suited to small Dredges with 4" -6" or 8" Pumps
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ERIE PUMP & ENGINE WORKS
152 Glenwood Ave., Medina, N. Y.

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OPEN STEEL FLOORING

Pressure Formed —
90% Open Area
Easy to Install

Hendrick Manufacturing Company
45 Dundaff Street, Carbondale, Pa.

project engineer. Mr. Graham is assigned to District No. 2, with headquarters in Clearfield, Pa.

Oscar Baarson, city engineer of Helena, Mont., for eight years ending last year, and since then consulting engineer for Townsend and East Helena, Mont., has been appointed priorities chief for Montana under the OPM set-up. He was assistant superintendent in the construction of the East Helena and Great Falls, Mont., smelters and aided in the construction of smelters in Chili and Peru. Mr. Baarson served as superintendent of mines for the Montana Lead Corp. at Rimini and also has served as resident engineer in the bridge department of the Montana state highway department.

Carl F. Koebrick, Spencer, Iowa, area engineer for WPA since 1937, has gone to King Cove, Alaska, where he will supervise the construction of an airport defense base.

R. L. Boyce of Holdredge, Neb., has accepted a position as resident engineer in charge of location and construction of power lines for the Central Nebraska Public Power & Irrigation district, Hastings, Neb. **Charles Mousel,** of Cambridge, Neb., has accepted a position as assistant resident engineer on the same project.

William C. Aegerter, area engineer for WPA at Sioux Falls, S. D., has been promoted to the position of construction engineer for the eastern part of the state and will have his headquarters at Mitchell.

J. C. Harper, Lawrence, Kan., has been named city engineer, succeeding **B. M. Babb,** who resigned to accept a position with the Public Work Reserve. Mr. Harper has been the assistant city engineer for a number of years.

W. Frank Rantsma, deputy city commissioner of public works at Fresno, Calif., since 1921, has been appointed city engineer to comply with a charter provision that the position must be filled by a licensed civil engineer. **Fred M. Ashley,** formerly city engineer, recently was appointed commissioner of public works following the resignation of **Jean L. Vincenz.**

John W. Beretta, president, J. W. Beretta Engineers, San Antonio, Tex., who also is president of the National Society of Professional Engineers, has been called into active service as a captain in the Air Corps, U. S. Army, and named engineer officer, Newfoundland base command, St. Johns, Newfoundland.

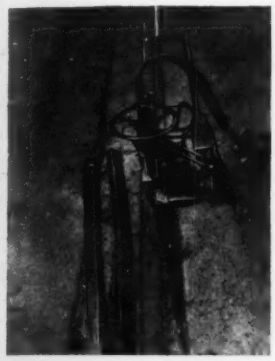
Nathan Itzkowitz, University of Wisconsin graduate, has recently accepted

Unused Car Tracks are a Source of Needed Scrap

and LINDE can help you remove them quickly...

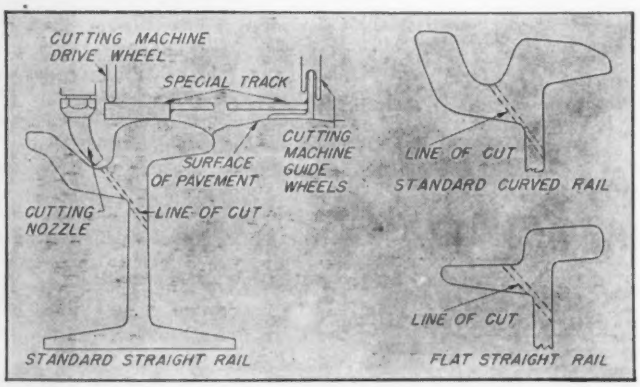
at low cost...with a minimum of repaving

How it is done



1. A portable Oxweld flame-cutting machine (CM-16) does the cutting of the rail. Two 6-ft. sections of special track for the machine to ride on are fabricated by oxy-acetylene welding, using flat stock and angle iron.

2. This view of a partially cut standard straight rail shows how a single cut severs the entire rail top from the web.



3. The direction of the cuts are shown above, on three types of rail. As the cut progresses, the operators remove the first section of track and attach it to the opposite end of the second section. The cut is thus continuous. The severed sections of rail are removed with a pinch bar. A strip only as wide as the exposed surface of the rail need be repaved.

MANY traction companies and municipalities are helping to avoid a shortage of steel scrap by removing from streets unused car tracks, which can then be sent back to the steel mills for productive use. To accomplish this more quickly, at lower cost, and with less repaving than is required by ordinary methods, Linde has developed an oxy-acetylene cutting procedure for removing the greater portion of such rails, with only a relatively small amount of steel left in the pavement. This procedure is outlined at the left.

ask Linde

If you would like to know more about this oxy-acetylene method for removing rails, *ask Linde!* And if you wish to use the oxy-acetylene flame to cut old rails — and other scrap — to lengths that facilitate handling and bring higher prices, Linde can help you organize such work so as to do it most economically.

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
30 E. 42nd St., New York, N. Y.
Offices in Principal Cities
In Canada: Dominion Oxygen Company, Limited, Toronto

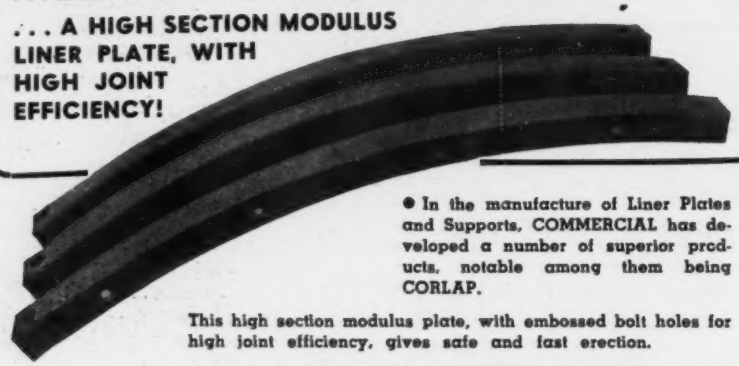
LINDE OXYGEN . . . PREST-O-LITE ACETYLENE . . . UNION CARBIDE
OXWELD, PUROX, PREST-O-WELD APPARATUS . . . OXWELD SUPPLIES

The words "Linde," "Prest-O-Lite," "Union," "Oxweld," "Purox," and "Prest-O-Weld" are trade-marks of Units of Union Carbide and Carbon Corporation.

COMMERCIAL IMPROVED TUNNELING PRACTICE

...BRINGS YOU CORLAP...

...A HIGH SECTION MODULUS LINER PLATE, WITH HIGH JOINT EFFICIENCY!



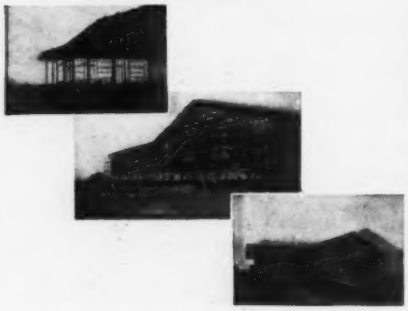
● In the manufacture of Liner Plates and Supports, COMMERCIAL has developed a number of superior products, notable among them being CORLAP.

This high section modulus plate, with embossed bolt holes for high joint efficiency, gives safe and fast erection.

Since its recent introduction, CORLAP has complied an enviable record on a number of tunnel jobs. Before recommending liner plates, get the facts on CORLAP and the many other COMMERCIAL Plates and Supports. This information will help you choose plates that assure faster, safer and stronger tunnel construction.

THE COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN OHIO

HOUSES IN VENEZUELA



The photos above show various stages of construction of a large number of houses built of Stran Steel and "GUNITE" to our specifications, at the San Tome Terminal of the Mene Grande Oil Company, C. A., Venezuela.

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Our Bulletin 1200 illustrates and describes many similar cases of building with "GUNITE", as well as numerous other applications. Send for a copy today!

The "CEMENT GUN" can be bought by anyone, and used without restrictions.

CEMENT GUN COMPANY
Manufacturers of the "CEMENT GUN"
ALLENTOWN, PENNSYLVANIA

WE ARE ALSO "GUNITE" CONTRACTORS
LET US BID ON YOUR WORK

Compact! Powerful! Safe!

DISTRIBUTABLE CONTROLLED POWER

with Beebe Bros. ALL STEEL HAND HOIST
SEATTLE, U.S.A.

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Money Has Been Saved on These Jobs!

1200' assembled pipe (132 Tons) were lowered to bed of Mississippi at St. Paul with 9—5-Ton Beebes, three lines to each hoist through blocks.
Hudson River Bridge sidewalks were laid in sections with 32—5-Ton Beebes.
Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

★

When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

BEEBE BROS., 2720 6th Ave. S., Seattle, U.S.A.

★

"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD"

a position as junior engineer with the Walsh Construction Co. and George F. Driscoll Co., general contractors, on U. S. Army base work in Trinidad, B.W.I. He formerly was employed as engineering aide in the Office of Post Utilities, Chanute Field, Ill.

Major Ira D. S. Kelly is now on an active status as major of Coast Artillery assigned to duty as a Quartermaster Corps officer and as the constructing quartermaster at Ft. Leavenworth, Kan., where a 1,000-man expansion is now nearing completion.

Commander George F. Nicholson has been called to active service with the U. S. Navy, 11th Naval District, San Diego, Calif. The private practice of Commander Nicholson, consulting engineer, specializing in harbor and beach preservation work, will be conducted on the Pacific Coast by **J. W. B. Blackman,** consulting engineer and **George K. Perkins,** attorney-at-law, his Washington, D. C. associate. The firm's office addresses remain unchanged.

Capt. Carl D. McWade of Dallas, has assumed duties at Fort Worth, Tex., as executive officer to **Major A. C. Bradley,** constructing quartermaster of the $2,000,000 Army Quartermaster Depot being built south of Fort Worth. Also added to the staff was **Lieut. Garland D. Crawford,** property guard and safety officer. Both officers were sent from the zone constructing quartermaster's office at Ft. Sam Houston.

Col. Elliott J. Dent, who has for the past year been on active duty in the office of the Chief of Engineers as senior member and executive of the Beach Erosion and Shore Protection Boards, has returned to the retired list and has resumed his consulting work.

Ray Heath, assistant engineer in the south district of King County, Wash., has been named county engineer, succeeding **Harry H. Sisler.** Mr. Heath has been with the county since he left the U. S. Army Engineers on the Bonneville Dam project in 1937.

C. H. Jex, a graduate in civil engineering from the University of Utah in 1930, has recently joined the engineering staff of the Public Works Reserve at Spanish Fork, Utah.

General Maximino Avila Camacho, brother of the president of Mexico and former governor of Puebla State, has accepted the presidential appointment as Minister of Communications and Public Works, succeeding **Gen. and Ing. Jesus de la Garza Gonzalez,** the incumbent since December 1 last, who resigned because of ill health.

Steel Conserved by Preformed Wire Rope would build 2,095 Anti-Aircraft Guns

★ **Each year American industry uses more preformed wire rope because it saves money by lasting longer, and saves time through fewer machine shutdowns for replacements. Operating men like it because it steadies production and increases safety.**

★ **Now all of a sudden, for another reason, preformed is tremendously important—because wire rope that lasts longer *conserves steel which America greatly needs.***

★ **For example, the steel conserved this year by the longer service of preformed wire rope will be enough to build 2,095 anti-aircraft guns.**

★ **Buying and using preformed wire rope is patriotism industrialized.**

PREFORMED WIRE ROPE

Ask Your Own Wire Rope Manufacturer or Supplier

In defense housing for 424 families "CZC"-treatment guards roofs against decay and termites

Du Pont CZC reported for active duty in this new housing project. Every roof in the development is built for service and low maintenance — with lumber treated with Du Pont CZC.

Lumber treated with Du Pont CZC is multiplied in life many times because it is decay resistant and termite repellent. It's also fire retardant, clean, odorless and paintable. CZC provides added factors of safety — including the continued full strength of lumber, improved nail holding power and resistance to wind storms.

Write for locations of plants supplying this service. E. I. du Pont de Nemours & Co. (Inc)., Grasselli Chemicals Dept., Wilmington, Del.

SPECIFY LUMBER TREATED WITH DU PONT CZC

(*Continued from p.* 142)

The finisher with its three revolving steel blades is stated to cover five times the area which the operator could finish by hand. The condition of the floor is said to be more accurate and more resistant to wear when finished with the power driven unit.—*Whiteman Mfg. Co., 3249 Casitas Ave., Los Angeles, Calif.*

Self-contained Air Conditioner

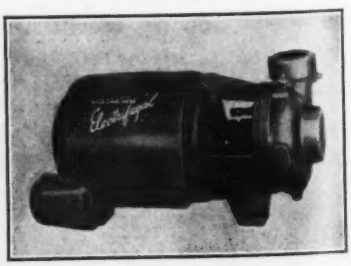
11. Supplementing its line of air conditioning equipment, the Trane Co. announces a new 15-ton unit which is completely self-contained. The unit can be incorporated in a regular system but is primarily designed for individual service and includes provision for the handling of both fresh and recirculated air. The unit includes three 12-in. fans, a reciprocating compressor, cooling coil, spray type humidifier and has provision for the inclusion of a heating coil if desired. Duct connections are provided at a 45 deg. angle permitting either horizontal or vertical travel. Dimensions of the model are length, 85 in.; width, 36 in., and height, 84 in.—*The Trane Co., La Crosse, Wisc.*

Fasteners for Non-metallic Sheathing

12. An improved method of applying asbestos siding over gypsum sheathing is provided in the new USG Nailex fasteners. This method holds the asbestos siding tight in the interest of producing a windproof wall of better appearance. The fasteners are applied after the siding has been nailed in place and are slipped over the ends of the nails, which protrude to the inner face of the sheathing, and are literally clinched over a wedge shaped fastener with an ordinary pair of pliers. This action tends to lock the siding into position and eliminates the possibility of the nails pulling loose.—*United States Gypsum Company.*

Direct Drive Pump

13. Differing from ordinary centrifugal pump design, the "Electrifugal" announced by Allis-Chalmers Mfg. Co., is a complete pump and motor unit on one



OFF AGAIN, ON AGAIN, DRILL AGAIN,

FINNIGIN

Section Foreman Finnigin's telegram "Off again, on again, gone again—Finnigin" was a vivid report of a difficult job with the fewest possible words.

If his cousin, Finnigin the drill runner, were to report to his boss on Timken Bits he, too, could vividly describe their performance in a very few well-chosen words . . . "off again, on again, drill again—Finnigin."

To the contractor who is still using bits forged as an integral part of drill steel, thereby paying excessive steel inventory costs and yet obtaining less footage per hour, we merely ask him to "think" about the phrase "off again, on again, drill again." It has a lot of ramifications all pointing to faster, cheaper drilling. Just write, we will tell you about them in detail.

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ON AGAIN

DRILL AGAIN

TIMKEN

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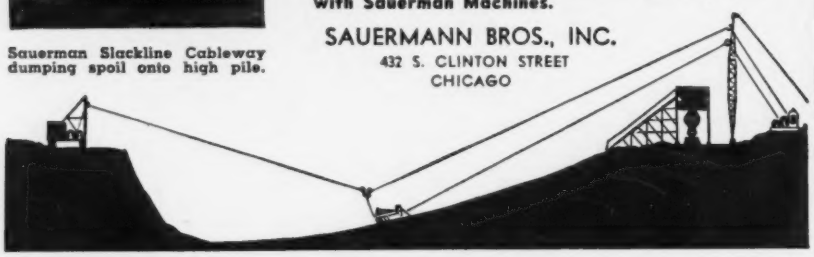

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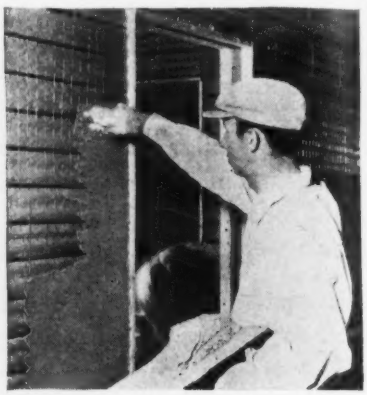
shaft and in one housing. In building installations it provides advantages of greater rigidity, less vibration and reduction in space occupied, according to statements released. The unit is stable with feet cast integral with the housing. The unit is available in sizes from 1 to 10 hp. at 3500 rpm for heads up to 160 ft. The unit is designed for convenient installation.—*Allis-Chalmers Mfg. Co., Milwaukee, Wis.*

Partition Walls

14. A 2 in., self-supporting partition wall has been developed consisting of steel ribs joined into a hollow core by means of flameproofed membrane sheets. This core is reinforced on both sides with steel wire welded to the vertical steel



ribs. This construction forms, on either side of the core, steel fabric bases monolithic plaster slabs of structural strength because of the continuous reinforcing. They are erected in units extending in one piece from floor to ceiling and require no supporting studs. This system, known as the Reyn-O-Wall, is said to represent a saving of 400 lb. of steel represented in the ¾ in. steel channels required for ordinary partitions. The system provides for all of the material (except plastering supplies) to be fabricated and shipped as a complete unit to the job.—*Reynolds Metals Co., Building Products Division, Richmond, Va.*

Heating and Ventilating Fans

15. Designed primarily for heating, ventilating and air conditioning service, a new fan has been developed by the B. F. Sturtevant Co. Identified as Silentvane Fan design 8, the unit is of sturdy construction. Its operating characteristics are stated to include the following advantages: (1) Lower power consumption; (2) lower maintenance cost, (3) slower rotative speeds and (4) higher efficiency over a range of operating speeds. It is available in both single and double width

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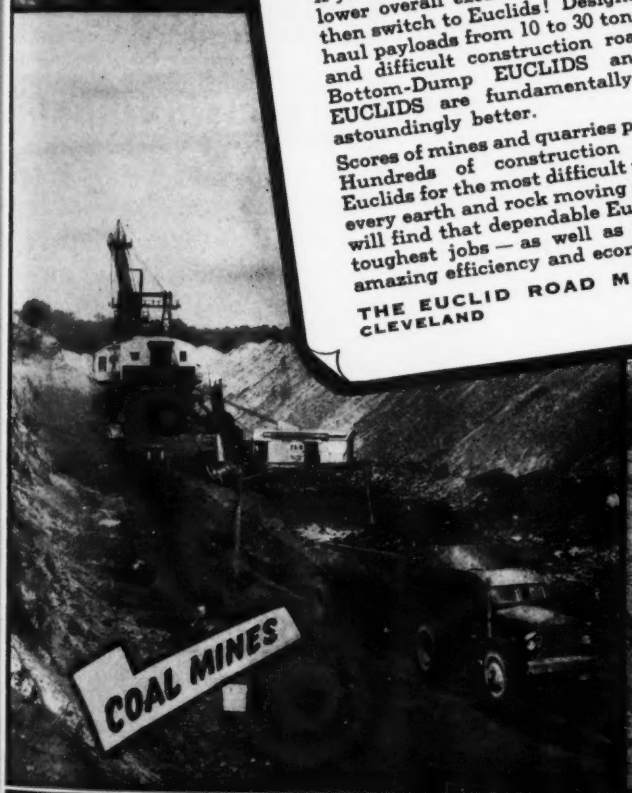

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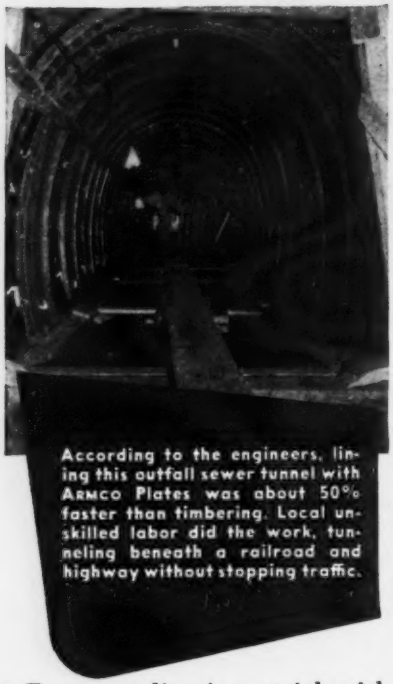

According to the engineers, lining this outfall sewer tunnel with ARMCO Plates was about 50% faster than timbering. Local unskilled labor did the work, tunneling beneath a railroad and highway without stopping traffic.

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On a strength-weight basis ARMCO Plates cost less than any four-flanged type. In many cases you actually buy fewer ARMCO plates because their great strength permits the use of alternate rings in partially self-supporting ground. You'll save even more by ordering ARMCO Plates to fit the job. There's a type and gage to meet every condition. Excess weight is out.

Try ARMCO Liner Plates on your next tunnel. Other contractors and engineers find them a big help in "holing through" ahead of schedule and under the estimate. Write for prices and complete facts. ARMCO DRAINAGE PRODUCTS ASSOCIATION, 505 Curtis Street, Middletown, Ohio.

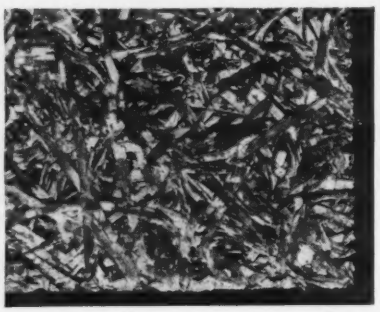
ARMCO

TUNNEL LINER PLATES

and single and doublet inlet, with wheel diameters ranging from 12 to 87 in.—*B. F. Sturtevant Co., Hyde Park, Boston, Mass.*

Structural Insulating Slabs

16. For roofs and walls of industrial plants, and other types of buildings, a structural insulating slab—Thermax—is available consisting of shredded wood fibers bonded together with a cement binder to an open weave possessing both thermal insulating properties and a considerable degree of sound absorption.

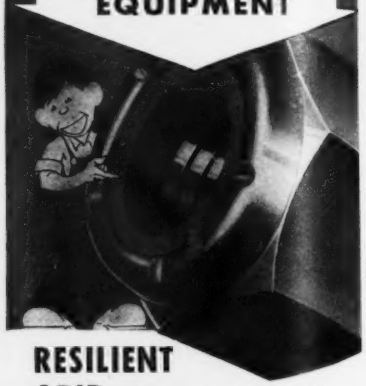


The material is fire resistant. Although the slabs have considerable structural strength, they are designed for shattering and will form no large heavy fragments in case of bomb explosion. The material can be used on industrial plant roofs by nailing the slabs on the underside of a timber deck and on sidewalk construction the usual procedure is to place this insulating material outside of the steel framework underneath the outer siding.—*The Celotex Corporation.*

Trailer for Moving Welders

17. For convenience in handling welding machines of the alternating current motor driven type (SAE-200 to SAE-600), a low, underslung type of trailer has been developed which is intended for either shop or yard use. It is capable of being towed at speeds up to 30 miles per hour and has a 31-in. width of tread and a method of balancing which makes

The SELF-LOCKING NUT THAT SAFEGUARDS CONSTRUCTION EQUIPMENT



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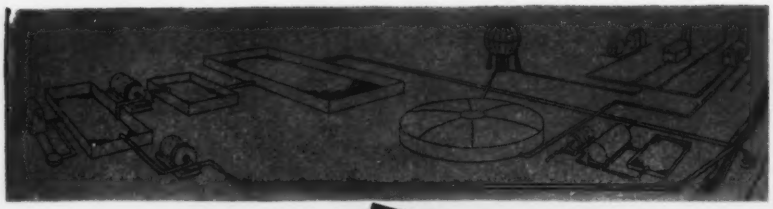

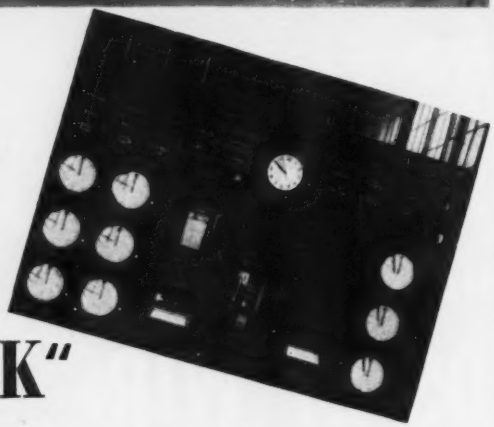

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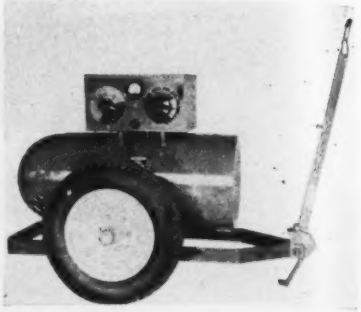


it easy to handle and set up after moving. The towing bar and the standing support are combined.

The illustration also shows a new type of control box (type G) designed to prevent accidental contact of live parts and to increase accessibility. This box has a separate compartment for all a-c circuits and another compartment for d-c terminals. The box is mounted entirely on the generator frame and has no permanent connection with the motor frame. —*The Lincoln Electric Co., Cleveland, Ohio.*

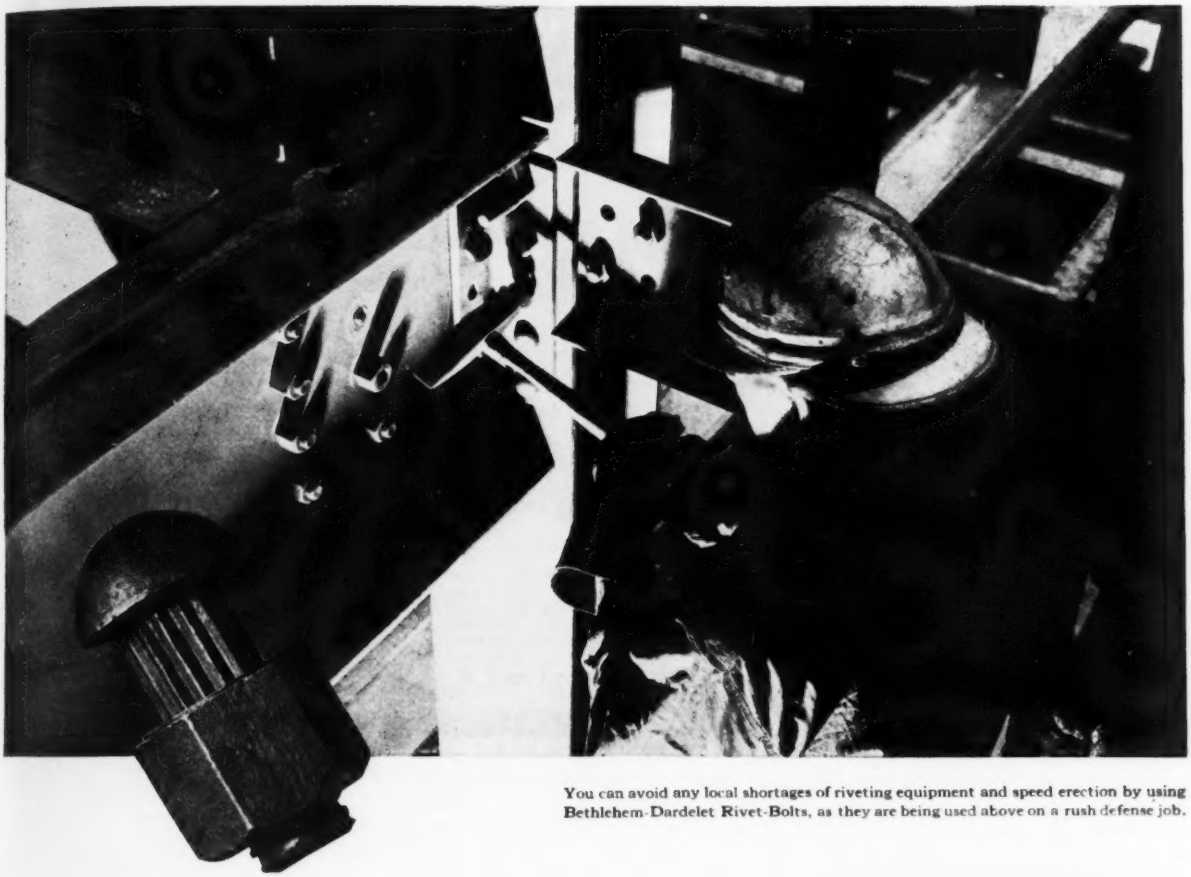
Fluorescent Unit for Industry

18. Fluorescent lighting units of 100 watt intensity are available in special designs for industrial installations where problems of higher mountings and wider bases have produced problems in the use of this modern type of illumination. They are also designed for producing higher levels of illumination at low mounting heights for work requiring this type of lighting such as fine inspection. Use of these large size units solves the problem of installing a larger number of smaller fixtures with added cost of installation. Reflector types provide white porcelain enameled reflecting surface for diffusion and durability. Reflectors are available with or without diffuser openings for softening the contrast between ceiling and lighted areas. The 60 in. 100 watt lamps are held in twist-turn type lamp holders with the fixture readily accessible for maintenance.—*Westinghouse Electric & Mfg. Co., Edgewater Park, Cleveland, Ohio.*

Electric Hammer

19. Using a principle which converts centrifugal force into reciprocating action, the Master Power Blow Hammer has been designed for cutting or drilling in concrete with drills up to a 2-in. size. Many other operations are applicable for the use of the unit. A feature of the machine is a provision which permits the hammer to strike only after it has been pushed onto the work, so that no damage occurs through idling. Further,

PUT UP STEELWORK FAST
with Bethlehem-Dardelet Rivet-Bolts



You can avoid any local shortages of riveting equipment and speed erection by using Bethlehem-Dardelet Rivet-Bolts, as they are being used above on a rush defense job.

Quicker to place

Bethlehem-Dardelet Rivet-Bolts need only be driven home with a hand hammer and tightened with a wrench. A bolting gang can place more than twice the number of Rivet-Bolts per hour than a four-man field gang can place rivets.

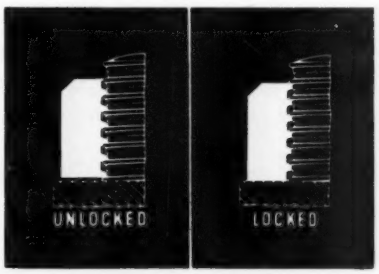
Can't come loose

These Rivet-Bolts have a patented self-locking thread which locks permanently when the nut is tightened with a wrench. Long experience has proven that, whether under full load or no load, this nut cannot be loosened by vibration, shock or motion.

Surprising economy

Considering the speed-up in placing and the elimination of costly riveting equipment and maintenance, it is easy to see that Bethlehem-Dardelet Rivet-Bolts are economical to use in the field.

Look further into the many merits of using Bethlehem's Dardelet Rivet-Bolts. It can pay you hansomely.



How self-locking thread works:

The nut runs finger-free up to the resisting surface. Then tightening with a wrench forces the tapered crest of the nut thread over the tapered and stepped root of the bolt thread into the locked position. Only unscrewing with a wrench will release this otherwise inseparable fastening.

BETHLEHEM STEEL COMPANY

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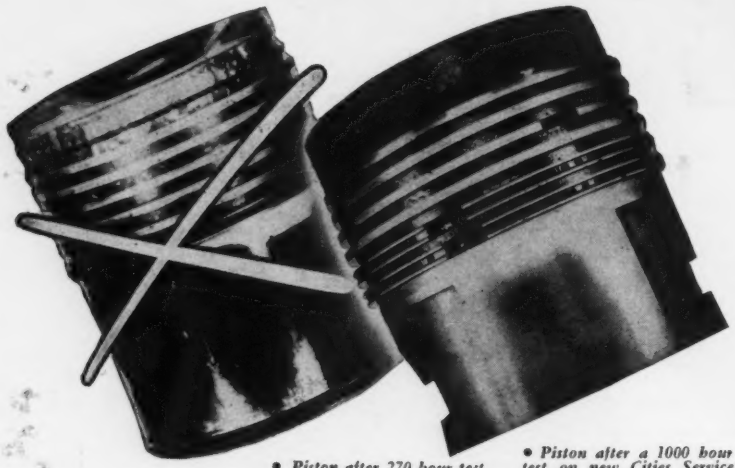
GUESSWORK ELIMINATED

with Service Proved Oils



• *Piston after 270 hour test on high quality mineral oil. Result: Failure from ring sticking.*

• *Piston after a 1000 hour test on new Cities Service Diesel oil.* Note clean skirt and clean, free working rings.*

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the impact of the blow is prevented from reaching the armature windings of the motor, insuring its longer service.—*Master Vibrator Co.*, 126 *Davis Ave., Dayton, Ohio.*

Steel Partition

20. Metlwal Paneling is the name applied to a new type of dry-wall construction using a panel of steel consisting of an exterior steel surface lined with asbestos felt, with a corrugated steel sheet backing. The same type of material is also used to produce M-P movable steel partitions which include two of the metal panels placed on steel studs, providing a double base partition of the flush type. One of the special features claimed for this construction and material is its permanence in service, equaling built-in partitions, although it can be easily moved and relocated. The partitions are available in heights extending from the floor to the ceiling, eliminating the necessity to fill the space between the cornice height and the ceiling with other partition material. — *Martin-Parry Corp., York, Pa.*

Concrete Floor Hardener

22. A varnish type of transparent concrete floor hardener and finishing material is being used on some of the new defense plants to offset the normal condition of cement floors and the development of dust. The material, known as Granitex, is claimed to result in easy-to-clean, oil-proof dustless cement floors. The material is not a chemical hardener and does not react with the elements of the concrete, being absorbed into the concrete and acting as a pore filler.—*The Truscon Laboratories, Inc., Detroit, Mich.*

Industrial Paint

23. A new type of synthetic mill paint, recommended for plants where unusual conditions require maximum durability, faster drying, and extremely washable surfaces, has been announced by the Sherwin-Williams Co. The new finish, called Kem Save-Lite, is said to cover with one coat and dry overnight to a

SPECIFY
a cement with waterproofing
"GROUND IN"

to waterproof your concrete

Experienced engineers prefer a cement with waterproofing "ground" with the clinker instead of admixtures. Such a cement assures an absolutely uniform dispersion of the waterproofing material throughout the cement.

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The two booklets shown at the left give the complete story on waterproofings and waterproofed concrete. Any engineer interested in the subject of waterproofing should read these two books. A copy of each may be had by sending in the coupon below.

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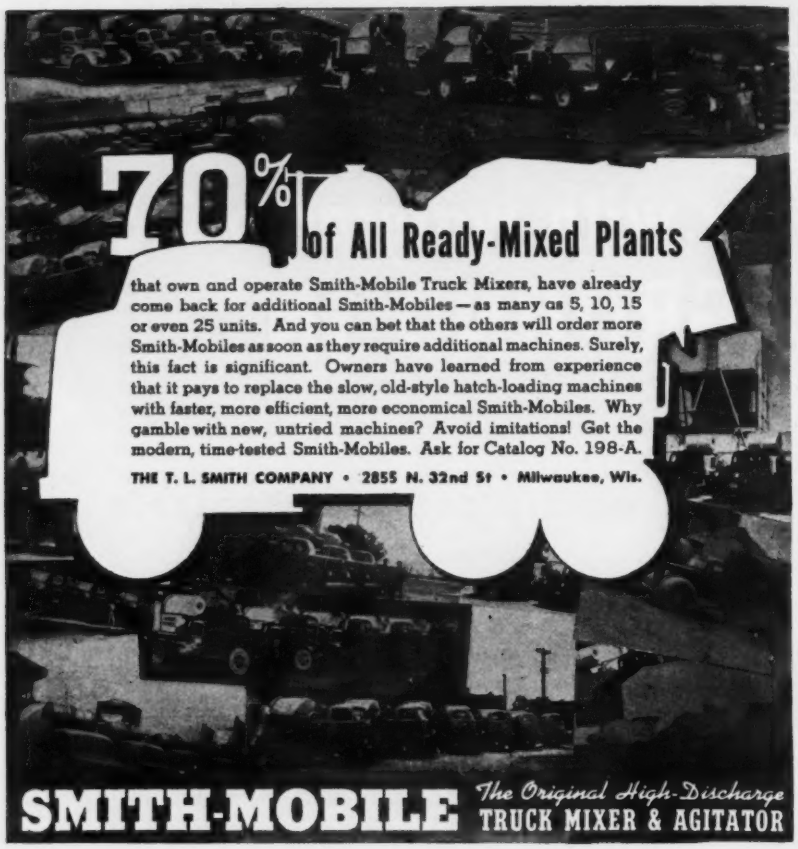
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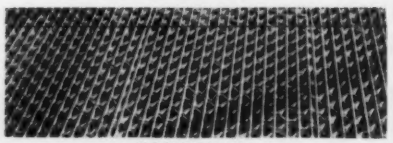
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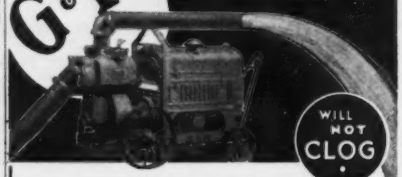

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Claims of fastest priming, highest suction lift, more gallons per minute, etc., do not pump water. On the job, the pump must do its own talking, and with dirty water, many a pump is inclined to stutter—and stop.

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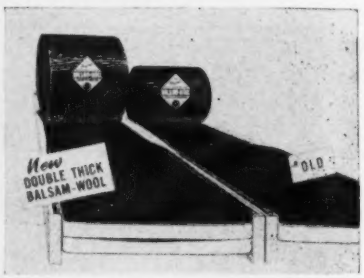
hard tile-like surface. The paint combines a new synthetic vehicle with improved pigments, and reflects and diffuses as much as 89 percent of the light entering a plant. It is claimed to have exceptional resistance to moisture and will stand repeated cleanings.—*The Sherwin-Williams Co., Cleveland, Ohio.*

Termite Shields

24. As a protection against termite infection in the walls of timber buildings, metal shields are available for capping concrete or other foundation wall material prior to the setting of the timber. Individual shields are available for posts or strip shields can be used for foundation walls. The shields are designed to meet specifications of building codes and the requirements of the U. S. Department of Agriculture.—*Timber Engineering Co., 1337 Connecticut Ave., N. W., Washington, D. C.*

Balsam-Wool Insulation

25. Combining a new principle of heat and moisture control, an insulating blanket made of Balsam-Wool has been made available by the Wood Conversion Co., which is said to provide greater efficiency as well as offer greater thickness of material. The new product is



made in widths to fit standard framing members. The blanket of double thickness has three individual moisture barriers, designed to protect the individual thickness supported by each.—*Wood Conversion Co., First National Bank Building, St. Paul, Minn.*

Material Carrier

26. To handle building materials such as lumber, pipe, brick, etc., on building operations and in plants, a new carrier has been developed (Series 70) of lighter weight and with a shorter turning radius. The Ross Carrier Co. states that the machine turns on an inside radius of 6 ft. fully loaded, and that the load hoist is of positive hydraulic type capable of lifting a full load in two seconds. Overhead clearance is 7 ft. 8 in., lower than usual machines and the operator's visibility is open on the sides and to the ground when straddling the load.—*Ross Carrier Co., Benton Harbor, Mich.*

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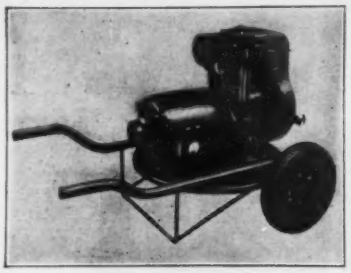

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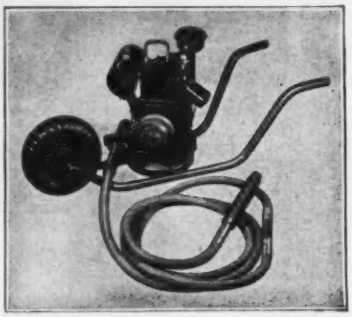

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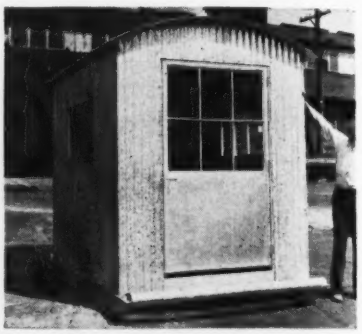
Wall Paneling

27. To provide a low cost, sanitary wall surface for a variety of industrial and home uses, Marlita Velvetex pre-finished paneling is available, which is claimed to be resistant to water, mild acids, alkalis and other common deteriorants. The material comes in wall-size panels, permitting easy application to large areas, and in 18 colors and patterns. The material is said to be particularly suitable for use in low cost housing.—*Marsh Wall Products, Inc., Dover, Ohio.*

Field Transformer Building

28. To house and protect transformers and other electrical equipment for use near large electric excavating machines, the International Steel Co. is producing a 6x8-ft., all-steel building mounted on



sled-like runners so that it may be pulled by a tractor. The building is equipped with standard steel windows, doors and locks, and is covered with corrugated siding. The claimed advantage of the portable building unit is to eliminate the length of low-tension cables, between transformers and power shovels or other excavating equipment. — *International Steel Co., Evansville, Ind.*

Gypsum Roofing Material

29. Pre-cast gypsum slab for roof decks, with galvanized steel binding clinched firmly into the surface and locked at all four corners to form a continuous one piece frame, is now available from the Certain-teed Products Corp. The gypsum core of the plank is reinforced with wire mesh, and the tongue and groove binding locks into adjacent units. Material handles and is erected like lumber, weighing only 12 lb. per sq. ft. Production of this material was acquired from the American Cyanamid & Chemical Corp., and the material continues to be manufactured in 15 in. by 10 ft. and 15 in. by 6 ft. sizes, both 2 in. thick. The product has been used on several large Army projects, combining strength, light weight and fire safety.—*Certain-teed Products Corp., 100 East 42nd St., New York.*

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REGARDLESS OF THE BLASTING INVOLVED, there's a Hercules explosive designed to do the work efficiently and economically. This list of Hercules explosives available to contractors includes all the old standard dynamites, plus grades that were developed to reduce costs and promote efficient blasting. One or more of the explosives listed below will be suitable for the work you have in progress or in prospect.

Gelamites* 1 and 2—The original semi-gelatin. Gelamite 1 replaces 60% gelatin and Gelamite 2 replaces 40% and 50% gelatin, cartridge for cartridge, at a saving of 10% to 15%. Lower strengths of gelatin are replaced by Gelamite 2 at a saving by reducing the number of cartridges in the charge. The Gelamites are sufficiently plastic and water resistant for most work. 224 to 244 cartridges, 1¼" x 8", in 100 lbs.

Hercomites* 2 to 7—The Hercomites, high-count ammonia dynamites, are the most economical explosives available. They are particularly suitable for open work, where they frequently save from 10% to 30% when substituted for Extra Dynamite or other grades. Hercomite Bag is a free-flowing explosive and is the most economical bag powder.

Cartridge for Cartridge Replacement Table Comparison of Hercomites 2 to 7 With Other Explosives

	Approximate No. 1¼" x 8" cigs. per 100 lb.	Approximate weight strength	Nearest Extra grade by bulk
Hercomite 2	240	65	50%
Hercomite 3	260	65	40%
Hercomite 4	280	65	40%
Hercomite 5	306	65	30%
Hercomite 6	330	65	25%
Hercomite 7	350	65	20%

Extra Dynamite—Strengths: 20% to 60%. 216 to 220 cartridges, 1¼" x 8", in 100 lbs. For general all-round work. Extensively used for clay blasting, road construction, stump and boulder blasting, quarrying, and electrically fired ditch blasting.

Straight N. G. Dynamite—Strengths: 20% to 60%. 208 to 220 cartridges, 1¼" x 8", in 100 lbs. Sensitivity of the 50% and 60% grades adapts them to propagated ditch blasting, and for accelerating fill subsidence in constructing roads through swamps. Also used for demolition (40%-60%), mudcapping hard boulders (40%-60%), and submarine blasting (60%).

Herculites*—Strengths: 20%, 30%, and 40%. They are free-flowing, ammonia type powders, packed in bags. Satisfactory for general blasting where free-flowing powders of this strength are needed. Herculite 2 (20%) is used for gully blasting in controlling soil erosion.

Gelatin—Strengths: 20% to 80%. 164 to 204 cartridges, 1¼" x 8", in 100 lbs. It is dense and plastic; is more water resistant, less bulky, and produces a smaller amount of objectionable fumes than other high explosives. Particularly desirable where concentrated loads, or great resistance to water, are required.

Gelatin Extra—Strengths: 25% to 90%. 180 to 208 cartridges, 1¼" x 8", in 100 lbs. Water resistance and fumes satisfactory for tunnelling, mining, and quarrying. Gelatin Extra has almost entirely replaced Gelatin grades for reasons of economy; but for the same reason, Gelatin Extra is often replaced by the Gelamites.

Blasting Gelatin—Strength: 100%. 206 cartridges, 1¼" x 8", in 100 lbs. The strongest and fastest commercial explosive. It is dense, waterproof, and has excellent fumes. Used for shooting oil and gas wells, for loading in the bottom of deep well-drill holes in very hard rock, cut holes in hard-rock tunnelling.

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NEW PUBLICATIONS
In the building field

A—Timber Design—The West Coast Lumbermen's Association announces three additions to its technical publications on timber designing, including two supplements (Nos. 3 and 4) to the Douglas Fir Use Book covering strength of lag screws and a nomograph covering bearing strength of wood. Another of the "Blue Ox" series, No. 2, presents design examples of timber roof trusses of 40, 60, 80 and 100-ft. span.—*West Coast Lumbermen's Association, Stuart Bldg., Seattle, Wash.*

B—Underpinning—A new brochure describes and illustrates many types of work carried out on the rehabilitation of buildings, moving of buildings, shoring, caisson work, underpinning and foundation work.—*Detroit Underpinning Co., 9120 Alpine St., Detroit, Mich.*

C—Paint—Data in booklet form provides information on the types of paint available for the interior finish of industrial plants with data on illumination values.—*Sherwin-Williams Co., Cleveland, Ohio.*

D—Heating Units—Technical Catalog 241-A of Modine Co. provides information on size and mounting of heater units—Convectors—of various sizes and under various building conditions.—*Modine Manufacturing Co., Racine, Wis.*

E—Lumber Products—A well illustrated catalog of lumber specialties and a descriptive folder of Rilco laminated timber arched rafters suitable for auditoriums, gymnasiums, garages and industrial plants has been released.—*Weyerhaeuser Sales Co., St. Paul, Minn.*

F—Plant Power Systems—An 80-page technical presentation is available covering all phases of electric power distribution and switching in industrial plants, with complete illustrations as to methods of installation and space requirements. The publication is titled "Plant Distribution Systems and Associated Equipment."—*Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*

G—Power Tools—Information on pneumatic hammers, portable generating plants, vibrators for both electric and gasoline power, and night lighting equipment, together with technical data describing equipment are presented in a series of booklets.—*Master Vibrator Co., Dayton, Ohio.*

H—Valves—An illustrated folder

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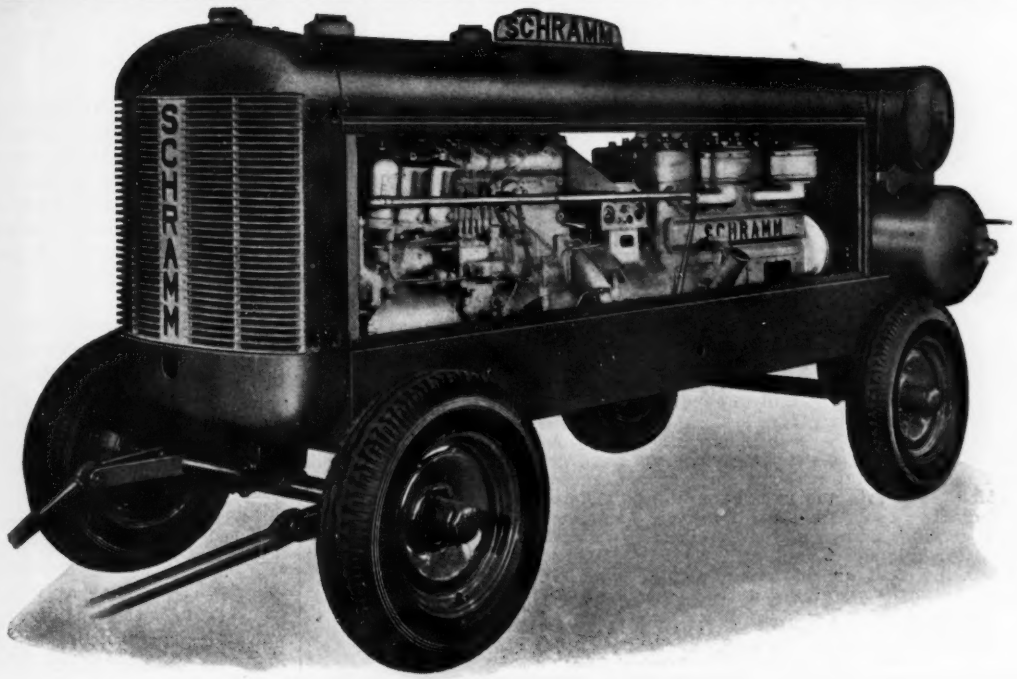

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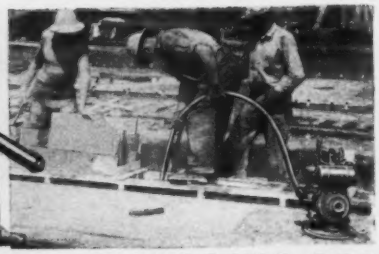

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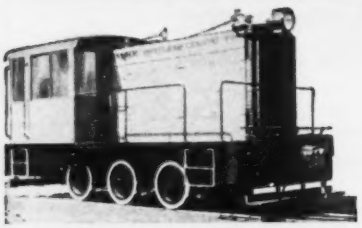

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reviews the types of valves manufactured.—*William Powell Co., Cincinnati, Ohio.*

I—Flow Meters—Publication 3010 reviews the types and characteristics of flow meters with technical data as to their installation.—*Cochrane Corporation, Philadelphia, Pa.*

J—Metal Siding—An illustrated booklet with design drawings shows the adaptation of Q-Panels for the walls and roofs of a typical industrial plant in the defense program. The booklet is titled "Robertson Q-Panels Speed Defense Construction."—*H. H. Robertson Co., Pittsburgh, Pa.*

K—Building Products—Steel products for the building designer including roof trusses, steel decking, bar joists, doors and other hardware are announced in an illustrated and descriptive booklet.—*International Steel Co., Evansville, Ind.*

L—Wire Rope Blocks—Single and multiple sheaves, with bronze and roller bearings and multiple sheave blocks of various designs are described and illustrated with data on dimensions and weights.—*Sauerman Bros., Inc., Chicago, Ill.*

M—Electric Equipment—A condensed catalog presenting factual information and descriptive matter on a full line of electrical equipment, including size of various panel boards.—*Square D Co., 6060 Rivard St., Detroit, Mich.*

N—Steel Windows—Industrial steel windows of all types are described and illustrated in detail, both as to dimensions and operation, with complete drawings showing method of installation, in a 40 page catalog. The information includes factual data indicating the connection of the sash to the steel building frame.—*Detroit Steel Products Co., 2250 E. Grand Blvd., Detroit, Mich.*

O—Precast Concrete—Description and illustrations of a system of precast concrete floor and roof members is presented in a leaflet which covers both industrial and residential construction.—*Price Bros. Co., Dayton, Ohio.*

P—Hangar Doors—Erection and operation of doors for airplane hangars, canopy doors and industrial type doors, with diagrams showing dimensions and operating features are described.—*Byrne Doors, Inc., 1150 Griswold St., Detroit, Mich.*

Q—Steel Scaffolding—Sizes of standard sections and methods of assembly for safety type of steel scaffolding are presented in a booklet illustrating

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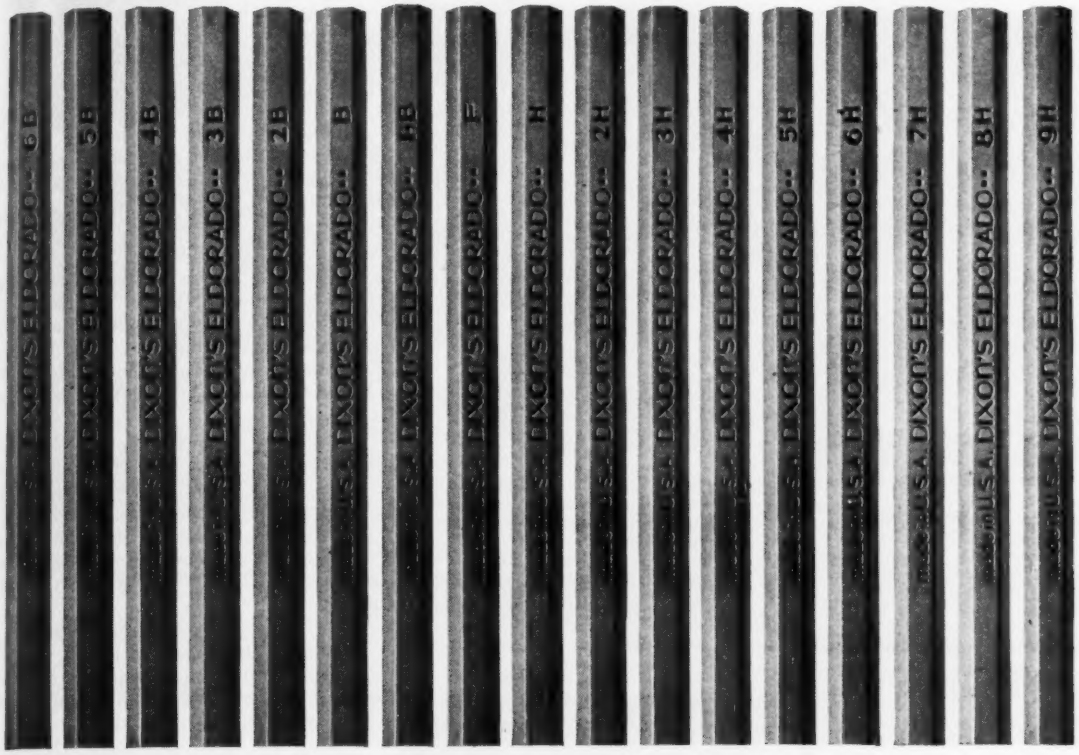

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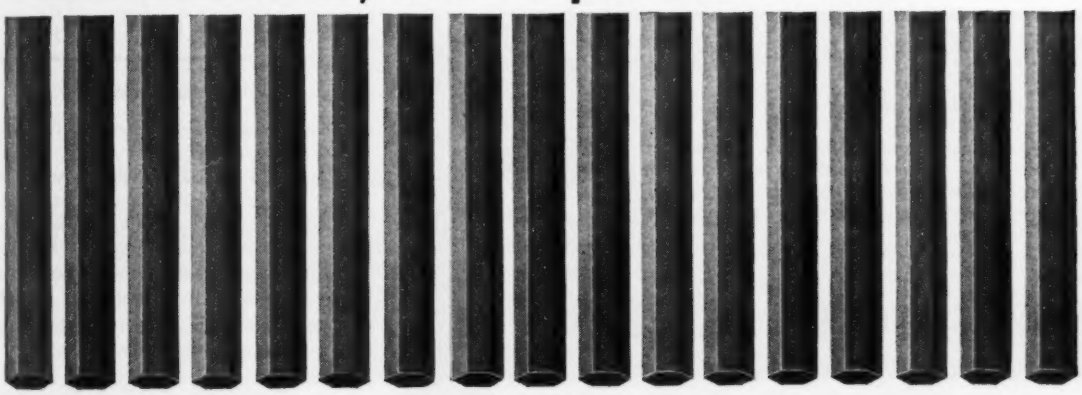

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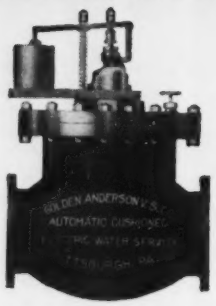

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method of assembly.—*Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit, Mich.*

R—Electrical Fixtures—Complete information is provided in a condensed catalog of 90 pages covering all types of electric equipment installations, including the sizes, weights and dimensions of panel boxes and switch boards.—*Bull Dog Electric Products Co., Detroit, Mich.*

S—Overhead Doors—Overhead doors for freight terminals, bus terminals, industrial and commercial buildings are described and illustrated in a booklet illustrating standard methods of installation.—*Overhead Door Corp., Hartford City, Ind.*

T—Waterproofing—A quick setting waterproofing material for repairing leaks in masonry, insuring against seepage and dampness is described with methods of application.—*American Fluresit Co., 27 E. Water St., Cincinnati, Ohio.*

U—Floor Hardener—A leaflet reviews the use of Duromit, a material for producing concrete floors of special hardness for industrial use.—*The American Fluresit Co., Inc., Cincinnati, Ohio*

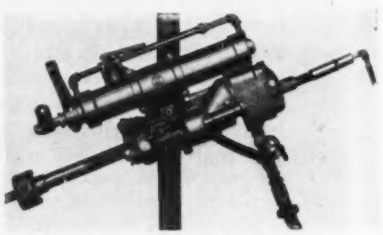
New Aids to the Constructor

Sweatband

A new light-weight absorbent sweatband, made of synthetic sponge, is 7½ in. long and covers a generous width of brow. The sweatband can be sterilized and used many times. It keeps the sweat out of eyes and off goggles, thereby keeping vision clear for workers in hot areas.—*American Optical Co., Southbridge, Mass.*

Diamond Core Drill

CP has introduced a lightweight "one-man diamond core drill which handles like a drifter. It is intended primarily for short hole prospecting, up to 500 ft., and can be used for blast hole drilling. It mounts on any standard rock drill saddle, works in any position and has about the same weight and air



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consumption as a 3½-in. drifter. The machine is powered with a CP rotary-vane air motor of a high-torque rotary type and has a speed range up to 1,500 rpm. A self-aligning air rod puller is available. Weight of complete outfit, including puller is 250 lbs. Bulletin No. 311 describes the outfit—*Chicago Pneumatic Tool Co., 6 East 44th St. New York City, or any branch.*

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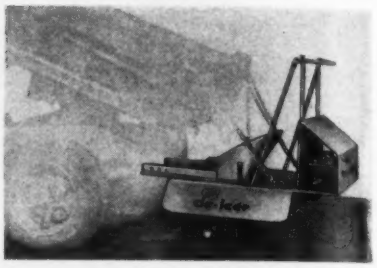
A dual drive de-icer, which can be used with or without the engine, is available for spreading de-icing materials on roads and streets. This new dual unit has a sand suppressor to permit the operator to protect on-coming traffic.



mercury clutch that automatically breaks the power flow when the unit is stopped by rocks, or when engine is turned off, and dual drive that requires less than five minutes to change from one to another. Manufactured by Huebner Mfg. Co., it is available from—*Ace Equipment Co., Oshkosh, Wis.*

All-Welded Dipper

A new P&H 1½-cu.yd. all-welded dipper has the advantage of a renewable manganese lip, renewable dipper teeth, and improvements in the latching mech-

anism. An important development is the absence of corner welds—achieved by forming a dipper back of the parent metal instead of the inserted plate type back.—*Harnischfeger Corp., Milwaukee, Wis.*

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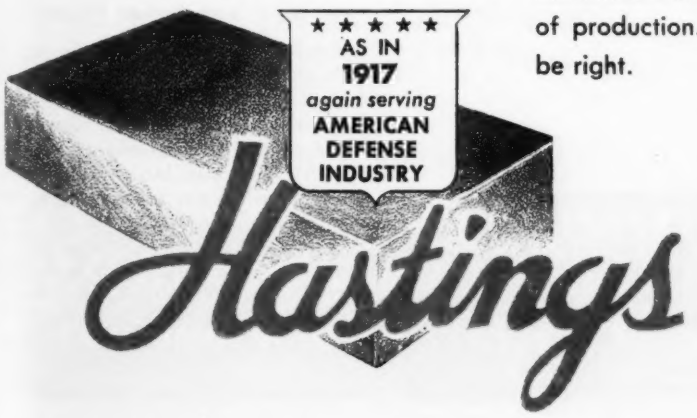

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Clutch Facings

Improved asbestos clutch facings covering the complete range of industrial and automotive service requirements have been announced by Gatke. Made of different materials and combinations and various methods of processing to meet operating conditions, these modern clutch facings are furnished in sizes from 14 ft. in diameter and weighing 1,000 lb. to tiny disks weighing less than an ounce. Gear-toothed facings with integrally molded teeth and cone-type facings are available in all shapes and sizes. —*Gatke Corporation, 228 N. LaSalle St., Chicago.*

Protective Coatings

Aquanil is a new, non-oxidizing waterproofing material for concrete, stone, wood, brick and metals and is one of a line of more than 35 products for protection of building structures, metals used in production and for the protection of many types of materials against water, sun, acids, and alkalis, as well as general wear. Another product introduced to constructors is Volcazite which protects metals against all forms of corrosion.—*Protective Coatings, Inc., 10391 Northlawn, Detroit.*

Industrial Battery Charger

An improved line of fan-cooled, copper-oxide battery chargers for charging 12-, 15-, or 18-cell electric truck lead batteries, or 16- to 24cell Edison type batteries, right where they are used; has been announced by G.E. They operate with a high starting rate which is automatically reduced to a safe finishing rate when the battery reaches 80 to 85 percent of complete charge. They can be installed wherever 3-phase a.c. power is available.—*General Electric Co., Bridgeport, Conn.*

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Kato has announced a new line of light and power plants in a series which includes 110-volt a.c. plants of 600-watts, 1000-watts, and 2000-watts. Generators of the self-excited, singlephase type, operating at 1800 r.p.m. D.c. current may be drawn from the d.c. terminals when the plant is not operating at full a.c. load, at desirable and usable voltage of 12-volts or 32-volts. The Kato line is powered with Briggs & Stratton 4-cycle, single-cylinder, air-cooled engines and is available with remote control or full automatic control as desired.—*Kato Engineering Co., 40 Elm St., Mankato, Minn.*

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Contents in Brief—To provide a water supply in six months for the Charlestown, Ind., smokeless powder plant the War Department chose to construct seven collectors of the radial well type. Work was begun Nov. 4, the first collector was in service March 31, and all collectors were completed in June, when the plant went into operation.

PERHAPS the largest single ground-water project in the world, a radial well water supply installation, recently went into operation to provide a maximum capacity of 49,000 gallons per minute for the War Department's Charleston, Ind., smokeless powder (2) fullest utilization of the available groundwater storage; (3) low infiltration velocities, with resultant pressure difference inside and outside of radial pipes being small, incrustation of pipe openings is eliminated and long life of screens assured; (4) a [illegible] no treatment re-

From a 3-page article in ENGINEERING NEWS-RECORD, July 31, 1941, describing and illustrating one of our installations, comprising seven units, which supplies a guaranteed capacity of 65,000,000 gallons per day. Reprints of this article are available upon request.

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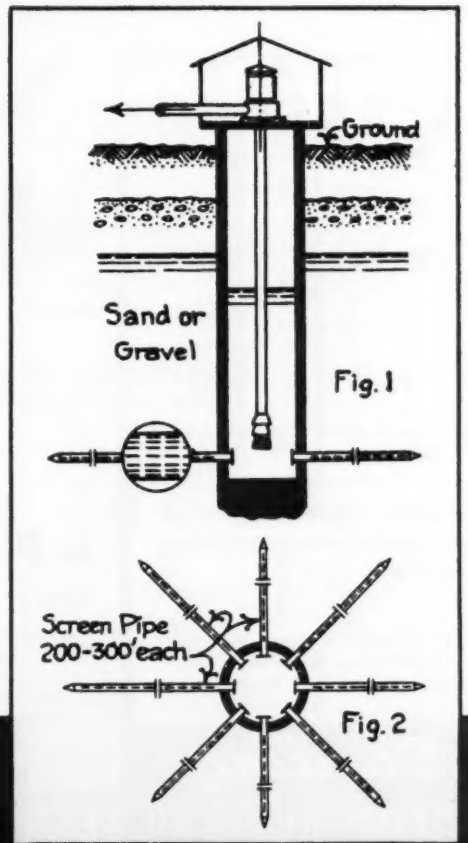

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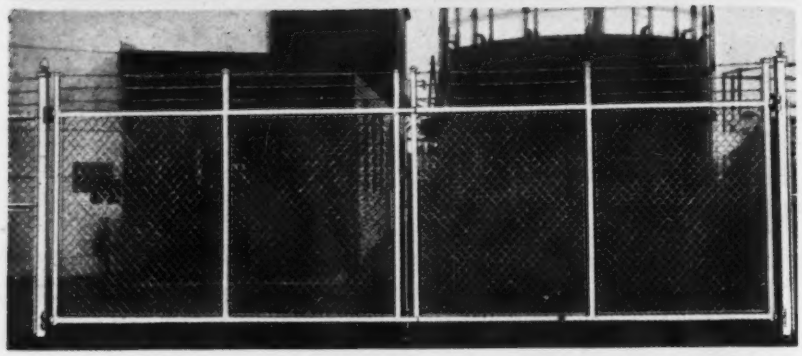

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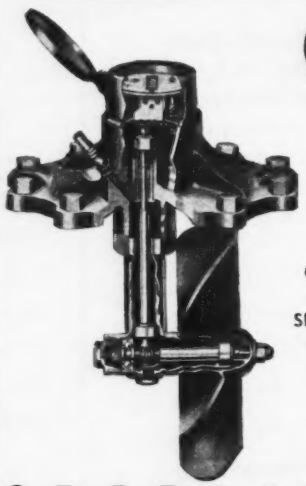

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3½-S Tilter—A new colored pamphlet describes the Smith 3½-S tilter mixer for use on the smaller job. This machine has feed chute charging, the famous Smith end-to-center mixing action, and is mounted for rapid and convenient *moving.—The T. L. Smith Co., 2835 N. 32nd St., Milwaukee, Wis.*

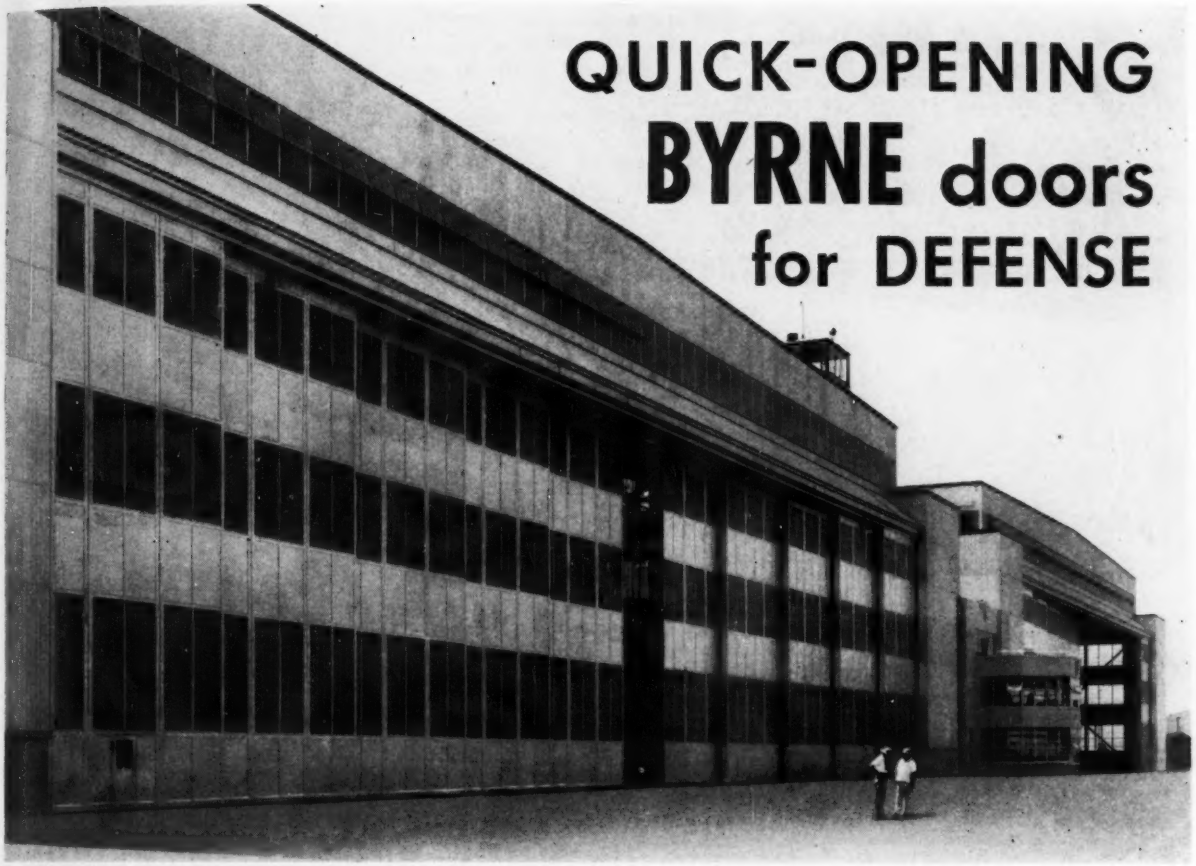
Machine Tools—A new and completely revised catalog of 56 pages pictures and explains in detail the standard line of metal and wood working machine tools made by Walker-Turner Co. Also shown are a number of entirely new machine tools developed primarily for the defense industries. The machines described include band saws, radial saws, circular saws, jointers, lathes and similar products.—*Walker-Turner Co., Inc., South Ave., Plainfield, N. J.*

Electrical Machinery—Those who are not familiar with electrical phenomena or terminology can acquire a good working knowledge by reading the 48-page "Catechism of Electrical Machinery" which explains electricity and magnetism, principles of d-c generators, alternators and a-c motors. Useful tables of practical application are included.—*Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.*

Welding Costs—Cost of arc welding electrodes can now be estimated rapidly for welding any type of joint of any thickness with either bare or coated electrodes by use of the new Airco "Electrode Consumption Calculator." This booklet tells how many pounds of electrodes are required per linear foot of weld and includes consumption figures for both bare and shielded arc electrodes on all metal thicknesses commonly employed.—*Air Reduction, 60 East 42nd St., New York, N. Y.*

Truck Hoists and Bodies—Bulletin No. 8 pictures and describes the various types of Gar Wood hoists and bodies which are available for installation on six-wheel chassis.—*Gar Wood Industries, Inc., Hoist and Body Division, Detroit, Mich.*

Shovel-Dragline-Crane — A 4-page folder, No. 1914, illustrates and describes the ½ yd. model LS-50 crawler shovel-dragline-crane. The folder covers new design features, of this excavator, such as non-clogging crawler treads, welded alloy steel lower frame, and simplified design.—*Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago.*



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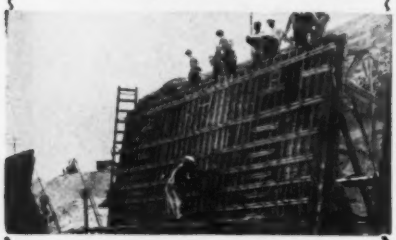

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Gear Catalog—The Link-Belt P.I.V. gear variable speed transmission is described in a new way in the 52 page catalog and data book, No. 1874. This gear is a positive, infinitely variable all-metal chain gear that permits any desired speed instantly and maintains it accurately. It is available in units of ½ to 15 hp. capacity with speed ratios up to 6 to 1.—*Link-Belt Co., 2045 W. Huntington Park Ave., Philadelphia.*

Tungsten Carbide Tools—A new manual contains instructional material covering virtually every conceivable factor connected with the use of tungsten carbide tools, much of it previously unpublished. Designed to simplify the carrying of tool stocks and enable faster securing of material, the manual contains numerous illustrations and examples of how special tools can be produced from "standard" tools by simple grinding operations.—*Carboloy Co., Inc., Detroit.*

Corrugated Sheet Piling—A new catalog "Corrugated Steel Sheeting Piling Specifications Book and Catalog," describes the design and unusual strength of corrugated sheet piling and features its desirability in the present material shortage. Because of the light weight and special design, corrugated sheet piling requires less space in transporting, can be installed by lighter equipment in less time and with less power and with the use of unskilled labor. Another important factor is said to be its high salvage value which makes it possible for the product to be used several times.—*Corrugated Steel Sheet Piling Division of the Caine Steel Co., Chicago.*

Wire Rope—A new wire rope booklet pictures uses of various cables and lists the recommended size and lay of cable for the various operations. Recommendations are made for the size and type of material for slings, as well as for all types of construction rope.—*Hazard Wire Rope Division of the American Chain & Cable Co., Inc., Wilkes Barre, Pa.*

Rubber—Vitalic mechanical and industrial rubber products are the subjects of an 8-page folder which describes the molded and extruded forms of rubber, hose of all descriptions and other rubber goods available.—*Continental Rubber Works, Erie, Pa.*

Recording and Control Instruments—Bulletin, No. 73-1, entitled "Brown Instruments for Sewage Sludge Digestion Plants" presents a very complete description of the Brown instruments which may be used to provide maximum efficiency of the sludge plant at lower cost. Described in detail are the liquid level recorder, temperature controller, pyrom-

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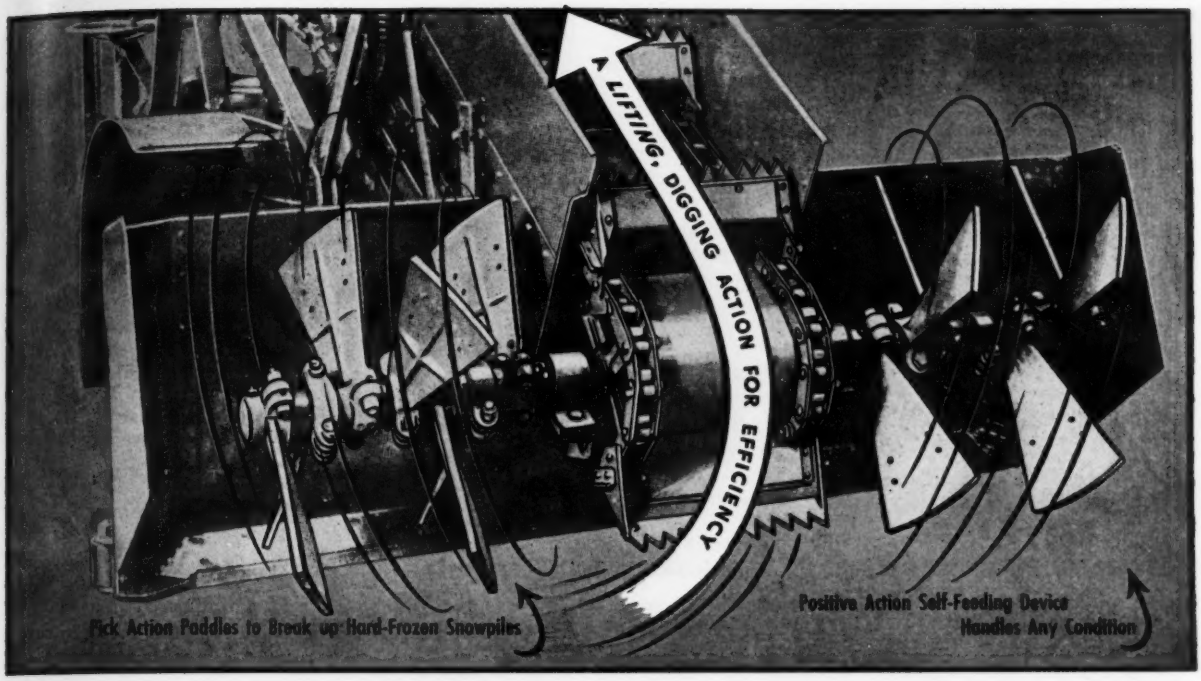
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eter, and flow meter.—*The Brown Instrument Co., Wayne & Roberts Ave., Philadelphia, Pa.*

Heaters for Railroad Switches—Electric heaters for outdoor railroad track switches are described in a 7-page folder which gives heater length and wattage recommendations for typical applications. Methods of mounting are discussed and auxiliaries such as transformers, and feeder lines are described. Ask for bulletin R-998.—*Department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*

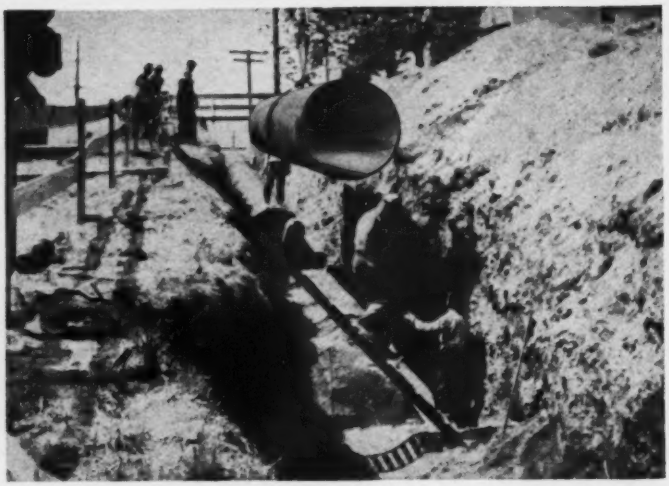
Steam Cleaners—Many typical uses are pictured and savings are given for principal classes of work to which the new Hypressure Jenny Steam Cleaner is adapted, especially cleaning of construction equipment. Information on the principle of operation, specifications and proper selection of models is fully covered.—*Homestead Valve Manufacturing Co., Coraopolis, Pa.*

Excavators—A new bulletin describes the numerous special features of the P&H, Model 150, ½-yd. excavator. Big, clear photographic illustrations make it easy to understand the famous P&H hydraulic control and the manner in which rolled alloy steel attachments permit easy changeover for shovel, clamshell, crane, etc. Ask for bulletin X19-1.—*The Harnischfeger Corp., Milwaukee, Wis.*

Pneumatic Hammers—I-R has just issued a new bulletin covering their line of modern Jackhamers. This booklet shows that "There's a Jackhamer for Every Job" by listing the applications and describing the advantages of each drill from the 30 lb. size to the 72 lb. size. Ask for Form 2775.—*Ingersoll-Rand Co., 11 Broadway, New York City, or any branch.*

Sanitary Engineering Lubrication—A recent issue of The Lubriplate Film, No. 4-41, is entirely devoted to the subject of lubrication of mechanical equipment as used in waterworks and sewage disposal plants.—*Fiske Brothers Refining Co., 129 Lockwood St., Newark, N. J.*

Tool Attachments—Special tool attachments which make ordinary portable drills into special angle tools in a few minutes are the subject of a well illustrated catalog just issued. This describes special angle tool attachments which can be operated by regular drills and take almost any stock for emergency repairs.—*Invincible Tool Co., Fort Wayne, Ind.*



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- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.

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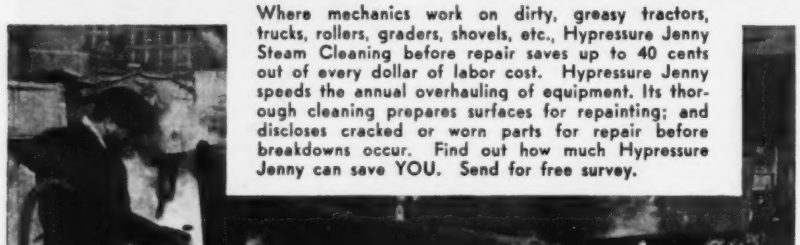
SAVE UP TO 40¢ OUT OF EVERY REPAIR DOLLAR

Where mechanics work on dirty, greasy tractors, trucks, rollers, graders, shovels, etc., Hypressure Jenny Steam Cleaning before repair saves up to 40 cents out of every dollar of labor cost. Hypressure Jenny speeds the annual overhauling of equipment. Its thorough cleaning prepares surfaces for repainting; and discloses cracked or worn parts for repair before breakdowns occur. Find out how much Hypressure Jenny can save YOU. Send for free survey.



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Tell us how, an how much JENNY can save us.

We have.....men employed on equipment maintenance.

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Flow and Liquid Level Meters—A new catalog contains 16 pages of useful and valuable information, written specifically to give the busy executive, plant engineer and instrument man a complete description of Brown mechanical flow and liquid level meters for indicating, recording, and controlling in as few words as possible.—*The Brown Instrument Co., Philadelphia, Pa.*

Street Forms—A new bulletin, No. 1828, describes steel street forms and presents diagrammatic sketches and photographs of form installations for concrete curb, curb and gutter, integral curb, sidewalks, gutters, flexible and fixed radius forms, etc.—*Blaw-Knox Co., Pittsburgh, Pa.*

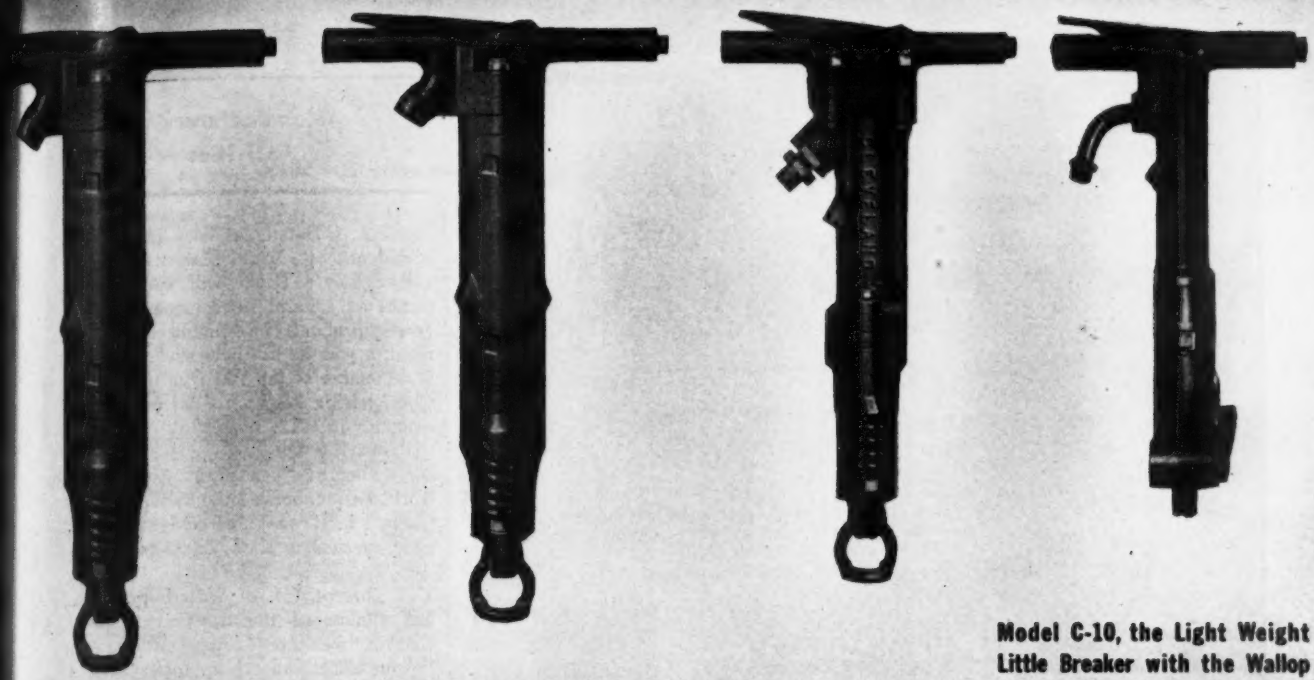
pH—"What Every Executive Should Know about pH" is the title of a concise and informative booklet which gives complete data on pH. Described briefly are some Beckman instruments for pH determination.—*National Technical Laboratories, South Pasadena, Calif.*

Drill Fittings—A pamphlet entitled "Diamond Core Drill Fittings (Third Edition), Commercial Standard CS17-42," describes the practice accepted by the trade as its standard of practice for new production beginning Jan. 1, 1942. —*U. S. Department of Commerce, National Bureau of Standards, Washington, D. C.*

Trenchers—The 200 Series Buckeye heavy duty trenchers are described in Bulletin No. 7B-200. These machines are pictured on work with side cutters which, in one model, enables trenching to the enormous size of 24 ft. deep and 144 in. wide.—*Buckeye Traction Ditcher Co., Findlay, Ohio.*

Aluminum — The Aluminum Service Bulletin, Vol. 1 dated Aug. 15, 1941, lists selected references on aluminum for the national defense industries. This is a list of 100 articles and booklets of special interest by engineers of the Aluminum Company.—*Aluminum Company of America, Gulf Building, Pittsburgh, Pa.*

Flow Meters—Originating as a flowmeter catalog describing the Cochrane line of flow-meters, "Flow-Meters by Cochrane" has grown to a 52-page handbook of instrument application to steam, water, air, gas and viscous, volatile and corrosive fluid measurement. Special sections are devoted to control applications and a list of available charts is included as a guide to meter users.—*Cochrane Corp., Philadelphia, Pa.*



C-9 for the Tough Job—
ard, Well-Seasoned, Re-
ced Concrete, and for
al Paving Breaking.

Model C-7, the All-around Machine for Paving Breaking, Cleaning Slag Pits, for Ice and Frozen Ground, etc.

Model C-11, the Medium Weight Paving Breaker with the Long Stroke and Powerful, Slugging Hammer Blow.

Model C-10, the Light Weight Little Breaker with the Wallop that Surprises! Specify This One for Trimming, and for Jobs Requiring the Operator to Lift and Handle the Machine a Great Deal.

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Line Up for Defense of the Nation!

's a strong line, too, these powerful, sturdy, efficient hines made by Cleveland. There'll be no bottle-neck e the Government and private contractors put Cleve- Breakers into the advance guard of road, fortification, nment, and general paving and demolition work. For elands DO turn out a better job, and at less cost for pressed air. This air economy is important in the oper- of paving breakers, because they are all run from ble compressors. When you put a Cleveland Paving ker on your hose line, you know you are getting more for every foot of air, and your compressor won't have bor to keep up, either!

veland Paving Breakers are in stock, ready to go out how you a real job of paving breaking or demolition. us where you want them delivered, and the size. 's all.

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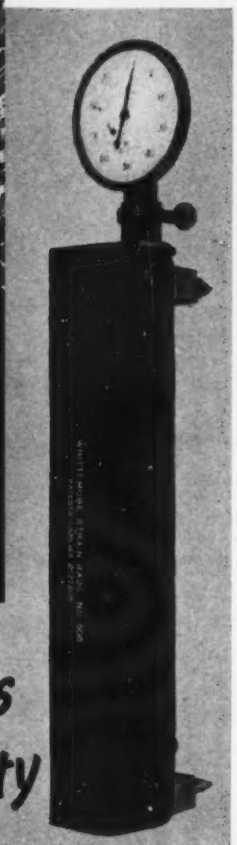
The Fourth Edition of the DRILLER'S HANDBOOK is now ready for distribution. Replete with ideas on getting more work out of your drills, paving breakers, and other types of pneumatic tools—full of suggestions that will enable you to save money on operating air equipment—this book will be sent FREE to those who write, giving us the type and make of rock drills, or other pneumatic machines, being used on your job. Price to applicants not furnishing this information is $1.00 per copy. Don't wait till our supply is exhausted!

EADERS IN DRILLING EQUIPMENT

Sidney Harbor Bridge



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Conserve Materials
Insure Safety
with WHITTEMORE STRAIN GAGES

The cost of engineering structures can be decreased through a more efficient use of material and the elimination of members which do not carry their share of the load. Safety can be insured by determining whether or not computed stresses are in close agreement with actual stresses.

Whittemore hand strain gages are inexpensive—can be used by observers having little training. With these, stresses in each member of a complex structure can be determined at a reasonable cost. Whittemore strain gages—rugged, simple, and accurate—are available in 2-in. and 10-in. gage lengths. Write for Bulletin N-153 describing these and other Southwark strain gages.

Baldwin Southwark
DIVISION OF THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA
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Manufacturers' Activities

JOHN A. O'BRIEN has been elected vice president of JOHNS-MANVILLE SALES CORP. Mr. O'Brien will continue his duties as general sales manager of the power products and industrial department, a post he has held since 1938. He is a member of the J-M Quarter Century Club, having begun his career with the company in 1915.

WICKWIRE SPENCER STEEL CO., of New York, has announced the appointment of GEORGE L. RANDALL as advertising manager, succeeding K. A. ZOLLNER.

THE BRISTOL CO. of Waterbury, Conn., has announced the transfer of H. R. BRISTOL from their Chicago office to their Boston office, and the appointment of J. E. BOOTH to take over the territory in Chicago.

THE CHICAGO PNEUMATIC TOOL CO. is staging what is believed to be the first window display of contractors' pneumatic tool equipment in its show window at 6 East 44th St., New York City. It is estimated that more than 10,000 people see this display daily. The important tools displayed in this exhibit are concrete vibrator, back fill tamper, sinker drill, demolition tool, sheeting driver, sump pump and clay digger. The outstanding feature of the exhibit is that it depicts the contractors' tools in use, thus demonstrating to the public how, where and why pneumatic tools are employed in the contracting field.

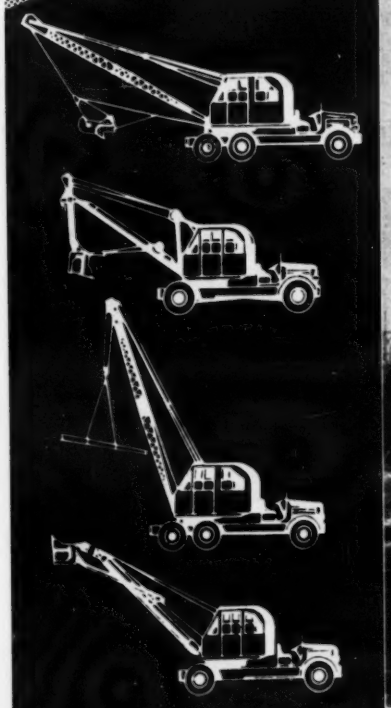
ORAN J. BROWN, traffic manager of the KOEHRING CO., Milwaukee, died recently after an illness of several weeks. He joined the firm in 1922 and has been traffic manager for the last ten years. He was 52 years old.

H. O. MELOY, of Zanesville, Ohio, efficiency engineer of the Columbia Cement division of the Pittsburgh Plate Glass Co., has been named superintendent of the STANDARD PORTLAND CEMENT CO. at Painesville, Ohio.

BROOK STEVENS, industrial designer, has been retained by the FWD Co., to restyle and streamline future FWD truck models. Mr. Stevens, a graduate of Cornell University, College of Engineering, is nationally famous in the profession of industrial design.

CARNEGIE-ILLINOIS STEEL CORP., Pittsburgh, has announced the appointment of PAUL F. VANDER LIPPE as assistant to the manager of sales in charge of the

CONVERTIBLE MICHIGANS FOR DEFENSE



QUICK CHANGE-OVER ADDS EARNING HOURS STOPS THE "MONEY-BURNING" HOURS!

Where there are two or more jobs for every available machine, the convertible MICHIGAN has an extra advantage. You get more "earning-hours", because you can change over from crane to shovel, clam, dragline or trench-hoe—in a couple of hours right on the job! Convertibility keeps the Michigan rolling on Defense!

Write, wire or phone *today* for Bulletin E-1101.

MICHIGAN

America's Mobile Shovel-Crane Specialists

MICHIGAN POWER SHOVEL CO.

BENTON HARBOR MICHIGAN

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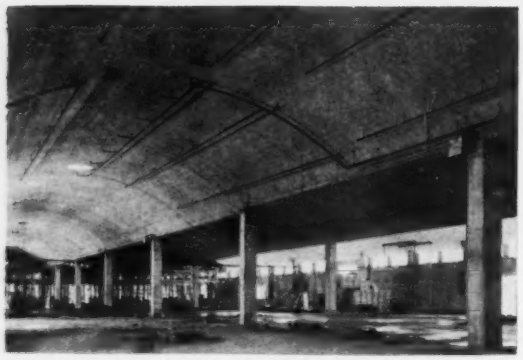
MODERN CONCRETE STRUCTURES

WAREHOUSES — DEFENSE PLANTS
AIRPLANE HANGARS — SHOPS

Several million square feet now under construction



- low in cost
- permanent
- fireproof
- speedy construction
- saving of many tons of steel
- no waiting for structural steel
- low vulnerability to attack
- built by local labor with local materials

★

ROBERTS & SCHAEFER CO.
ENGINEERS
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NEED A BIG Trailer?
La Crosse Makes Them Up To 200 Ton Capacity-
** WRITE OR WIRE **
LA CROSSE TRAILER & EQUIPT. CO.
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SIMPLE RUGGED DEPENDABLE
CONSTRUCTION EQUIPMENT
STERLING QUALITY
PUMPS — HOISTS
LIGHT PLANTS—SAW RIGS
Sterling Construction Equipment on your job means increased production and larger profits.
Ask for literature and prices
Sterling MACHINERY CORPORATION
411-13 Southwest Blvd. Kansas City, Mo.

Kansas City office. He succeeds HOWARD J. MULLIN, who was recently transferred to Detroit. WILLIAM G. CROOK, assistant manager of sales in charge of the Buffalo office, succeeds CHARLES E. MCINTYRE, also recently transferred to Detroit.

WHEELCO INSTRUMENTS CO. has announced a third major expansion of its organization, including moving to the new Wheelco Building, Harrison and Peoria Sts., Chicago, Ill.

HAROLD G. SMITH, formerly chief engineer of the Automotive Division of THE BUDA CO. at Harvey, Ill., has been promoted to executive engineer of Buda in charge of all engineering of the automotive and marine and industrial engine and radial diesel engine divisions.

THE DRESSER MFG. CO. of Bradford, Pa., has opened a new warehouse at 1121 Rothwell St., Houston, Texas, in charge of DAVID H. GEISER, to make available to the Southwest ready-made joints overnight for speedy laying of pipe lines. C. T. DAVIS, district manager, gas and water division, and H. R. SHIDEL, district manager, oil field division, will have their headquarters at the new district office now located at the warehouse address above.

ZIEGLER MACHINERY, INC. of Pittsburgh, have announced the opening of their new building and display room at Noblestown Road and Mansfield Ave., Greentree Boro., Pittsburgh.

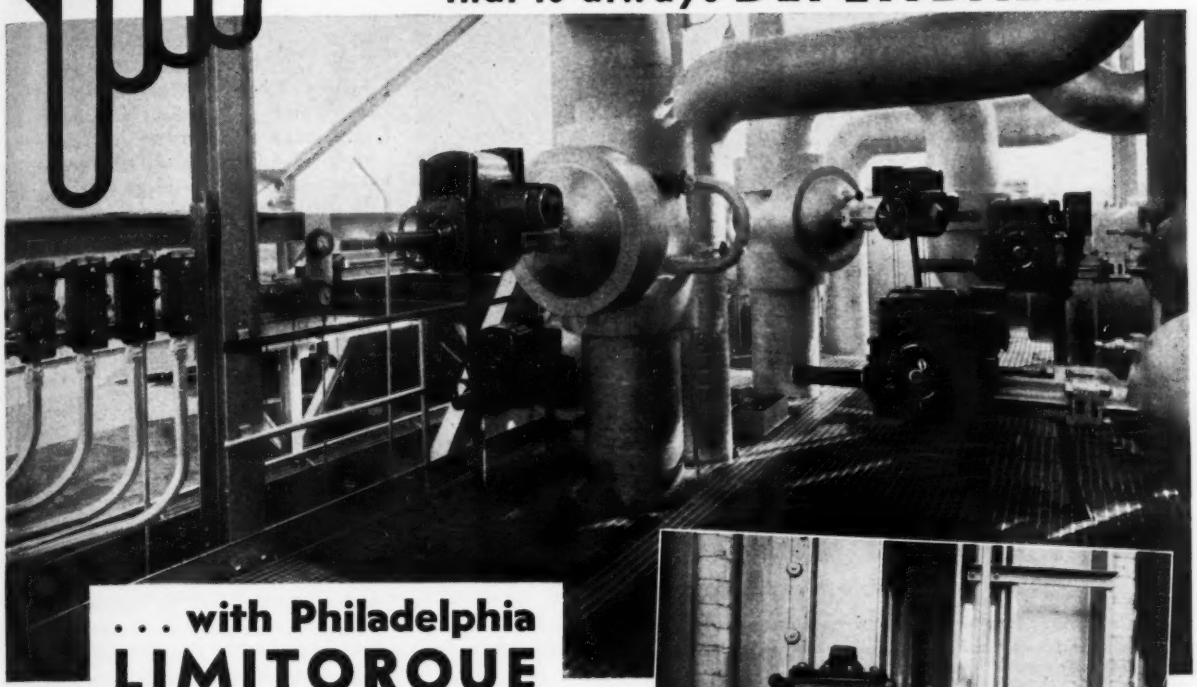
KENNETH M. ANDERSON, with headquarters at 2115 South San Pedro St., Los Angeles, Calif., will be in charge of RAWLPLUG-LOS ANGELES CO., a branch of the Rawlplug Co., 98 Lafayette St., New York City, manufacturers of expansion anchors of all types.

CHARLES H. DOLAN, pilot in the World War Lafayette Escadrille and former vice president of operations of Eastern Air Transport, Inc., has been appointed general manager of the newly formed aviation division of CHICAGO PNEUMATIC TOOL CO. Mr. Dolan will be in charge of all aviation equipment production and development at the recently acquired plant at Garfield, N. J.

THE COOPER-BESSEMER CORP. has announced that at a meeting of its board of directors GORDON LEFEBVRE, former American Locomotive Co. executive, was elected its vice president and general manager. Mr. LeFebvre, a graduate of Virginia Polytechnic Institute, brings to the company long and varied experience, including affiliations with E. I. du Pont de Nemours & Co., General Motors Corp. at its Chevrolet division (where he

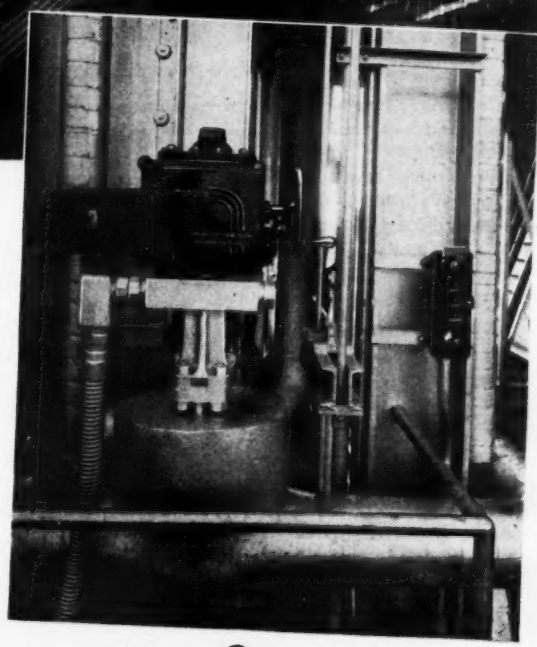
FINGERPOINT VALVE OPERATION

that is always DEPENDABLE

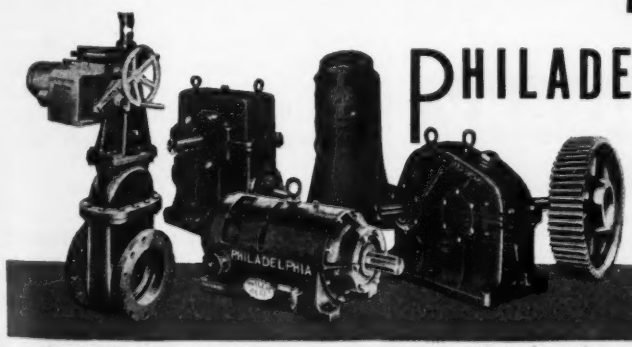


. . . with Philadelphia LIMITORQUE VALVE CONTROLS

Because of their proven reliability in service . . . Opening and closing valves with Limitorque Controls is one of the simplest jobs around the plant. The easy pressure of a finger on the buttons of a conveniently located control station sets the Limitorque in operation . . . opening the valve to a predetermined position or closing it firmly but safely, without the slightest chance of damage to valve parts. The torque limit switch instantly shuts off motive power if any obstruction is encountered. Limitorque is fast, operating at the greatest practical speed. All types of valves from 3" to 96" diameter can be operated with Limitorque, as well as sluice gates, etc. Can be adapted to existing equipment. Write us for complete information.



These two photographs show a few of a large number of Limitorque Controls at the Avon Plant of Pacific Gas and Electric Co. Many more are installed in their other plants.



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NEW YORK • PITTSBURGH • CHICAGO

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NOVO DIAPHRAGM PUMPS

(The Old Reliable With a Modern Design)

Novo Diaphragm Pumps will handle any type of pumping on a dewatering job, mud, sand and trash laden water, with full volume or just seepage.

Don't make the mistake of putting a centrifugal pump on a diaphragm's job.

SEEPAGE—Presents no problem to the Diaphragm pump. When water falls below the suction the pump automatically idles with no heating or excessive wear. When water comes up, pump immediately picks up its prime.

Anything that can get through the suction strainer can easily pass through the pump without damage. There are no close clearances to wear. There are no adjustments to make, only the occasional changing of diaphragms. This operation can be done in less than three minutes by any laborer.

The gearing is all enclosed and running in oil. The clean-out plate can be taken off without the use of a wrench.

3" and 4" sizes, also double open and closed models, all bearing the A. G. C. rating plates.

Contractors swear by the NOVO DIAPHRAGM PUMPS, not at them.

Look into the *Novo Self-priming, Centrifugal Pumps, Pressure Pumps, Hoists* and *Light Plants.*

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NOVO ENGINE COMPANY
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Please send literature and information on:

SELF-PRIMING CENTRIFUGAL PUMP..... LIGHT PLANTS.....
NOVO DIAPHRAGM PUMP..... HOISTS.....
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worked directly under William S. Knudsen), Canadian vice president of General Motors, and finally vice president in charge of General Motors Pontiac division until he joined the American Locomotive Co. in 1937 as manager of its diesel engine division at Auburn, N. Y. He is a member of the Society of Naval Architects and Marine Engineers.

G. K. VIALL, vice president of CHAIN BELT CO. of Milwaukee, has been appointed as head of a new division of research and development now being organized by the company. In assuming his new position, he will also retain his position as vice president in charge of the construction machinery division. B. F. DEVINE, who joined the Chain Belt organization in 1909, has been promoted from sales manager of the construction machinery division to the position of manager of that division, in which capacity he will also supervise the management of construction machinery sales.

A modern, 24-ft. annealing furnace has recently been installed by JOSEPH T. RYERSON & SON, INC. of Chicago, for annealing their stock steel products after they have been flame-cut.

The manufacture of Dayton couplings and accessories will be discontinued by the Dayton Coupling Division of the NATIONAL SUPPLY CO., Pittsburgh. Concurrent with this announcement is the news that the National Supply Co. has been appointed by DRESSER MFG. CO., Bradford, Pa., as a national jobber of Dresser products and will henceforth stock and sell Dresser couplings and fittings, repair clamps and sleeves and extra parts, such as gaskets, bolts, etc. Replacement parts for Dayton Couplings and accessories will be available from Dresser, who have acquired the coupling business of the firm.

GEORGE L. GEUSS has been appointed to the sales staff of the PITTSBURGH EQUITABLE METER CO. at Buffalo, N. Y. succeeding WILLIAM L. HERRON, resigned. Mr. Geuss will work in the New York state territory.

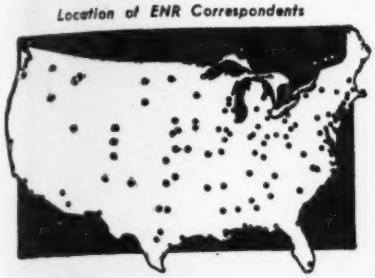
ELMER ISGREN, former LeTourneau plant superintendent, has been appointed manager of the entire LeTourneau factory at Peoria, Ill. He succeeds RAY PETERSON, vice president and plant manager, who resigned Sept. 15 to conduct business on the West Coast.

LINK-BELT CO. of Chicago has announced the appointment of WILLIAM A. CRAIG as purchasing agent of the company's Philadelphia plant to succeed JAMES C. LENAHAN, who died suddenly in September at Somers Point, N. J.

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

Location of ENR Correspondents



Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply — Unclassified
Sewers, Waste Disposal — Latin America
Bridges, Grade Cross'gs — Public Buildings
Streets & Roads — Commercial Buildings
Earthwork, Waterways — Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: All low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

WATER SUPPLY

PROPOSED WORK

Ark., Washington—City, c/o Mayor, deep well, pump, etc. $50,000. DPW aid sought.

†Colo., Denver—U. S. Eng., 1709 Jackson St., Omaha, Neb., drilling well, furnishing, installing pumps, electric motors, water storage tank, pump house, Buckley Field. $20,000.

Idaho, Shoshone — C. U. Alig, city clk., $75,000 bond election Nov. 4, WW imprvs., well, mains, pumps, storage tank. R. J. Briggs, Robert Noble Bldg., Boise, engr. CD 10/9—ENR 10/16.

†Ind., Walkerton—Town, water sys. addn., extens. Docket Ind. 12-113. $7,000. **DPW.**

†Ia., Danville—Town, water and sewerage sys., Docket Iowa 3-102. $120,300. **DPW.**

Kan., Coffeyville—Surveys increasing water supply facilities. Over $15,000. Burns & McDonnell, 107 W. Linwood Blvd., Kansas City, Mo., engrs.

†Kan., Junction City—WW imprvs. $75,000. DPW. C. M. Schmitley, Junction City, engr. CD 10/8—ENR 10/6.

★**La., New Orleans**—A. G. Moffatt, secy. Sewerage & Water Bd., water sys. exten. $2,280,000. Applied for DPW funds.

Miss., Biloxi—L. Braun, mayor, WW imprvs., expansion. $208,510. Seeking govt. aid.

Miss., Columbus—T. W. Harris, mayor, WW imprvs., $250,000. DPW funds sought.

Miss., Flora—WW sys. $34,700. Seeking govt. aid.

Miss., Greenville—M. C. Smith, mayor, new WW. $211,145. DPW funds sought.

Miss., Hattiesburg—G. Calhoun, mayor, WW extens., imprvs. $130,414. Seeking govt. aid.

★**Miss., Hattiesburg**—Bd. Supervs. Forest Co., WW and sewer work in Forest Co., not incl. Hattiesburg. $565,412. DPW funds sought.

Miss., Jackson — W. A. Scott, mayor, WW exten., imprvs. $70,000. DPW funds sought. CD 8/5—ENR 8/7.

Miss., New Augusta—Bd. Supervs. Perry Co., WW and sewerage works, outside Sew Augusta. $165,286. DPW funds sought.

Miss., New Augusta—Mayor, WW and sewerage sys. imprvs. $163,273. DPW funds sought.

Miss., Pascagoula—W. R. Gulley, mayor, WW imprvs., expansion. $147,996. Seeking govt. aid.

Miss., Wiggins—T. S. Andres, mayor, WW exten. $70,166. DPW funds sought.

Mo., Florissant—C. G. Peters, city clk, defeated $15,000 bonds WW exten.; voted $6,000 bonds completing public sewerage sys. Russell & Axen, 4903 Delmar Blvd., St. Louis, engr. CD 9/19—ENR 9/25.

N. J., Keansburg—Water plant imprvs., installing new well. $50,000.

N. J., Milford—Milford Boro Council, standpipe, mains in Mount Pleasant Hill, for Riegel Paper Co. housing. $30,000. F. Bohren, Milford, engr.

†N. C., Bonnie Doone—Town, water distr. sys., Docket N.C. 31-159. $71,000. **DPW.**

O., Conneaut—WW sys. imprvs. $68,000. Bond issue authorized. W. Kantola, city engr.

O., Elyria—Bd. Comrs. Lorain Co., E. R. Cummings, clk., 8,460 lin. ft. 6 in. water line in North Ridge Rd., Elyria and Sheffield Twps. $30,000. B. E. Patterson, Court House, co. engr.

O., North Royalton (P.O. Cleveland)—W. Clements, village clk., bond election Nov. 4, watermain, Ridge, Royalton and N. Royalton Rds. $60,000. F. Smith, Pub. Square Bldg., Cleveland, co. sanitary engr.

O., Vinton—B. S. Casto, mayor, WW plant and distr. sys. Over $15,000. P. W. Elwell, 5005 Euclid Ave., Cleveland, engr.

Okla., Oklahoma City—E. Simon, city clk., rejected bids Sept. 30, water filtration plant and pump. station addns. $194,300. V. V. Long & Co., Colcord Bldg., engr. CD 10/7—ENR 10/9 under LB.

Pa., Greenville—Boro Council, purchasing, imprv. facilities Greenville Water Co. Over $30,000. Morris Knowles, Inc., Westinghouse Bldg., Pittsburgh, engr. CD 9/26—ENR 1/2.

Tex., Ballenger — C. P. Shepherd, mayor, WW exten. $67,500. Applied for DPW funds. J. E. Ward, Harvey-Snider Bldg., Wichita Falls, engr.

Tex., Corpus Christi—Nueces County Water Imprvt. Dist. 1,824 Jones Bldg., water imprvs. $50,000. DPW funds applied for. O. N. Stevens & John Polhamus, c/o Southern Alkali Corp., Corpus Christi, engrs.

Tex., Galena Park—R. DuBose, mayor, WW and dist. sys. imprv. $69,017. DPW funds applied for. H. G. Olmstead, Box 1016 Houston, engr.

Tex., Hooks — J. R. Guinn, mayor, WW sys., reservoir, treatment plant, distr. lines, sanitary sewerage sys., incending collecting mains, disposal plant. $494,500. Applied for DPW funds. Rollins & Forrest, Praetorian Bldg., Dallas, engrs.

†Tex., La Marque—Galveston Co. PW Water Control & Impvt. Dist. 3, WW sys., Tex. 41-265. $140,000. **DPW.** J. J. Rady, Majestic Bldg., Fort Worth, engr.

Tex., Lott—W. G. Ruble, mayor, voted bonds WW imprvs., extens., mains, hydrants, etc. $22,000.

†Tex., Mineral Wells—City, dual main from Lake Mineral Wells to city and Camp Wolters, etc., $286,250. **DPW.** J. Montgomery, Littlefield Bldg., Austin, J. J. Rady, Maj. Bldg., Fort Worth, and Freese & Nichols, Capps Bldg., Fort Worth, engrs.

Tex., Terrell—P. I. Austin, town mgr., WW sys. imprvs., exten. $75,000. Albert C. Moore & Co., 2404 Smith-Young Tower, San Antonio, engrs.

Wash., Puyallup—East Woodland Water Dist., WW sys. $130,000. Federal funds sought. Parker & Hill, Smith Tower, Seattle, engrs. CD 8/22—ENR 8/28.

Wis., Oxford—Town, WW supply sys. $40,000. General Eng. Co., Portage, Wis., engr.

Ont., Belleville—Gore & Storrie, engrs., 1130 Bay St., Toronto, and C. A. Mott, city engr., bids early 1942, water sys. exten., water mains, reservoir, filters, pumps, $227,000.

Ont., Ottawa—Chairman Bd. Contract, bids soon supply, installation 3 turbine driven centrifugal pumps $85,000, 2 addnl. sand filters, Lemieux Island purification plant $70,000. W. E. MacDonald, City Hall, engr.

Que., St. Louis de Courville—Exten. WW sys. $25,000.

BIDS ASKED

Bids Asked October 28

N. C., Salisbury—WW imprvs., water purification plant addn., 1 m. g. covered rein.-con. reservoir, relocating 18 in. sewer, relocating, constructing pipelines, furnishing, installing high duty gasoline engine-driven pump. W. C. Olsen, Raleigh, consult. engr.

O., Toledo—J. H. Jewhurst, dir. Pub. Serv., installing 12,500 ft. 20 and 24 in. c.i. or steel watermain, valves, manholes, etc. Over $15,000. C. L. Piper, city engr.

Bids Asked October 29

†Ala., Mobile—U. S. Eng., Federal Bldg., Mobile, 400,000 gal. elevated water tank, Gunter Field.

Bids Asked October 30

Mass., Boston—Commonwealth of Mass. Metropolitan Dist. Comm., Water Div., 20 Somerset St., Contr. 137, 6,570 lin. ft. 24 in. steel watermains, etc. in Arlington. Over $75,000.

Bids Asked November 3

Ill., Chicago—City, O. E. Hewitt, comr. P. Wks., superstructures low lift pump. sta. and filter bldg., administration bldg., South Dist. Filtration Plant, vicinity E. 79 St. and Lake Michigan adv. ENR 10/23.

†Wash., Tacoma—Pierce County Fire Dist. 2, c/o Parker & Hill, engrs., Smith Tower, Seattle, (1st unit) drilling 2 wells and imprv. 2 existing wells in area bounded by Steilacoom, Gravelly and American Lakes, near here. Bids later on pumping equip. and electrical work, elevated steel storage tanks, distr. sys., Docket Wash. 45-129. $402,057. **DPW.** CD 10/8—ENR 10/16.

Bids Asked November 10

Wash., Cathlamet—Public Utility Dist. 1, water supply sys., 87,000 ft. 2 to 8 in. pipe, 200 service connections, etc. for Puget Island. J. H. Lewis, Railway Exch. Bldg., Portland, Ore., engr.

CONTRACTS AWARDED

Ark., Ft. Smith—C. Holland, mayor, 4 m. g. reservoir, **WPA. $95,404.**

Ill., Centralia—Municipal water sys. imprvs. earth dam, to R. B. Potachnick, Cape Girardeau, Mo., **$331,254**; pump stations, to G. E. Tillman, Centralia, **$142,640.** CD 9/2—ENR 5/8.

N. Y., Portville—Pump house for water supply sys., centrifugal pump and motor, compressor, etc., to Harry Swanson, Portville. Est. **$15,000.** Douglas Roulo, c/o owner, engr.

†O., Columbus—Con. Q.M., 250,000 gal. elevated steel water storage tank, Columbus General Depot, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., **$27,236.** Bids 10/6, awarded 10/7.

O., Winchester—E. W. Reighley, mayor, WW sys., dam, watermains. **WPA. $150,000. $200,000** bond issue approved. CD 7/25—ENR 7/31.

★**Okla., Oklahoma City**—Exten., imprv. water works distr. lines, storage rooms at pump station, clearing Bluff Creek Reservoir Area, imprv. Lake Overholser Reservoir. **WPA. $526,000.** R. Lee, City Hall, engr.

Pa., Bethlehem—Bethlehem Water Auth., 16 watermain to Coke Works Rd. plant of Allentown-Bethlehem Gas Co. Over $15,000. R. L. Fox, c/o owner, engr.

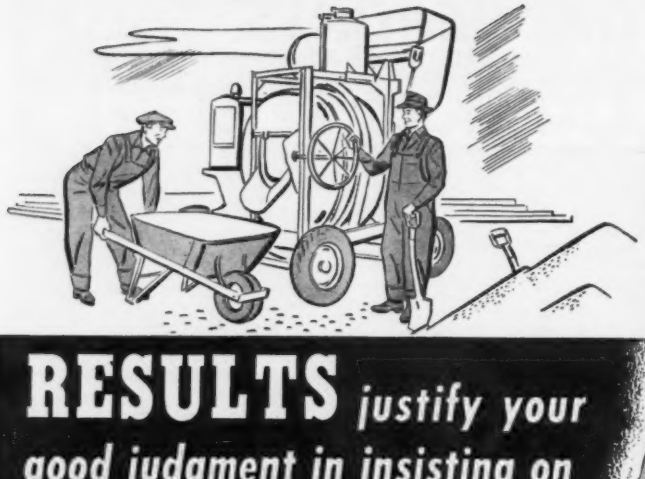
†Tex., Camp Wolters—Con. Q.M., watermains, sewers, utilities facilities for hospital area, to Ramey Bros., Inc., Amarillo, **$37,639.** Awarded 10/9.

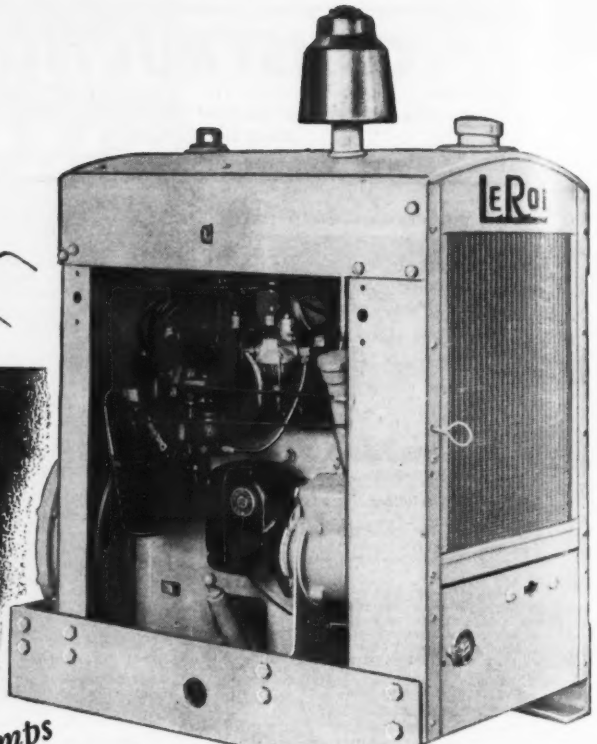
Tex., Edinburg—Waterlines to gunnery school, force account. Approx. **$16,000.** A. Tamm, Harlingen, engr.

†Tex., Waco—City, additional WW sys. imprvs., exten. 8 mi. 6 in. c.i. main, steel storage tank, pump house, etc., for airport, **WPA, $52,500.**

†Utah, Ogden—Con. Q.M., Utah General Depot, Ogden, 5 mi. 12 in. water supply line from Military Springs to storage reservoir, Hill Field Arsenal and Airport, to Ernest Stettler, Logan, **$35,532.** Bids 10/7. CD 10/3.

Wis., Potosi—WW sys. and well, to F. A. Moser Constr. Co., Farmersburg, Ia., **$27,993**; well, to Dubuque Well Drilling Co., Dubuque, Ia. Cullen & Morrow, Platteville, engr. Bids 9/29. CD 9/23.





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WATER SUPPLY (Contracts Awarded, Cont'd.)

Ont., Fingal—Dpt. Transport, Ottawa, Ont., water supply main, Aerodrome, British Commonwealth Air Training plant, to National Iron Corp., Ltd., foot of Cherry St., Toronto, $34,930.

Ont., Hamilton—Barton Twp., Court House, Hamilton, watermains, Barons, Barton, Cameron, Woodbridge and Lawrence Sts., Barton Twp., to A. Cape & Sons, Ltd., 10 Albert St. $20,000. A. A. Braughton, Court House, Hamilton, clk.

Ont., Mountain View—Dpt. Transport, Ottawa, water supply works for Aerodrome Bombing and Gunnery School, to Armstrong Brothers Constr. Co. Ltd., Brampton, $24,000.

Ont., Trenton—Dpt. Natl. Defense for Air, Ottawa, additional water storage and pumphouse, ground services, to Sterling Constr. Co., Ltd., 2492 Sandwich St. E., Windsor, about $35,000.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Petaluma—G. R. Wallin, city clk., 800 lin. ft. 15 in. and 18 in. concrete storm drains.

Calif., Santa Clara—Surveys sewage disposal plant, sewage line. Over $25,000.

Conn., Groton—Boro, D. F. Armstrong, warden, 300 Thames St., sewage disposal plant, disposal sys. $200,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., engrs. Applied for federal grant.

Ill., Morton—Sewage disposal plant.

Ia., Earlville—J. Bramley, mayor, sewage disposal plant. $30,000. Currie Eng. Co., Webster City, engrs.

†**Md., Towson**—Baltimore County Metropolitan Dist., Essex Pump. Station, sewer main, Docket 18-101, $155,000, **DPW.** S. A. Green, Joppa Rd., ch. engr. CD 9/9—ENR 9/16.

Mass., Winthrop—T. Key, chn. Bd. Selectmen, Town Hall, preliminary survey, brick rubbish and refuse incinerator plant. Over $25,000.

★**Miss., Biloxi**—New sewerage sys., disposal plant. $1,400,250. DPW funds sought.

★**Miss., Gulfport**—W. G. Simpson, mayor, new sewerage sys. $992,800. DPW funds sought.

Miss., Hattiesburg—G. Calhoun, mayor, incinerator, $65,448. DPW funds sought.

Miss., Lucedale — Sewerage sys. $100,000. DPW funds sought.

Miss., Pascagoula — Sewerage sys. $69,750. DPW funds sought.

Miss., Wiggins—T. S. Andres, mayor, sewerage sys. $82,304. DPW funds sought.

Mo., Normandy (br. St. Louis)—Normandy Sanitary Sewer Dist., R. M. Dodson, pres. Bd. Trustees, 23 Bellerive Acres, St. Louis County, sewage treatment plant, sanitary sewers. $160,000. Applied for DPW gr. G. S. Russell, 4903 Delmar Blvd., St. Louis, engr.

Mo., St. Louis — Jennings-West Walnut Manor Sewer Dist., V. P. Wieck, secy. Bd. Trustees, 6401 W. Florissant Ave., combined storm water and sanitary sewers, Jennings, $276,000. Applied for DPW gr. G. S. Russell, 4903 Delmar Blvd., St. Louis, engr.

★**Mo., Wellston (Sta. St. Louis)**—Wellston Sewer Dist., S. A. Brewster, pres. Bd. Trustees, 1516 Engelholm St., sanitary and storm water sewers. $2,000,000. Applied for DPW gr. H. Shifrin, 1221 Locust St., St. Louis, engr.

†**Neb., Bellevue**—City, additional sanitary sewer facilities, Docket Neb. 25-101. $50,000. **DPW.**

N. J., Linden—Sheeting, 2,075 ft. 48 in. concrete storm sewer and 340 ft. 24 in. rein.-con. sewer, appurtenances. $50,085. WPA. J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, owner's and WPA engr.

N. J., Perth Amboy—Sheeting, 8-to 18-in. vitr. tile, 21 and 24 in. rein.-con. trunk sewers. $98,087. WPA. J. H. Weitsen, Smith and Hobart Sts., Perth Amboy, owner's and WPA engr.

N. J., Sayreville—11,230 ft. 8 in. terra cotta sanitary sewers, manholes, etc., various streets. $61,249. WPA. J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, owner's and WPA engr.

N. Y., Astoria—President Queens Boro, 120-55 Queens Blvd., Kew Gardens, sewers 21 St., Hoyt Ave. N. and adjoining locations. $114,200.

N. Y., Brooklyn—President Brooklyn Boro, Boro Hall, sewers, Shell Rd., Coney Island Creek to Belt Parkway. $75,000.

N. Y., Forest Hills—President Queens Boro, 12-55 Queens Blvd., Kew Gardens, storm sewer, Horace Harding Blvd. $80,000.

N. Y., New York—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., sewage disposal plant for Schoharie Watershed, Windham $250,000.

N. Y., New York—President Bronx Boro, 851 Grand Concourse, storm water sewer, Boston Rd., Bronx Boro.

N. Y., New York—President Bronx Boro, 85 Grand Concourse, combined relief sewer, Webster and Brook Aves. from Fordham Rd. to Bronx Kills, $50,000; Jerome Ave. from E. 172 St. to Harlem River, $35,000.

N. Y., Ozone Park—President Queens Boro, 120-55 Queens Blvd., Kew Gardens, sanitary sewers, North Conduit Ave., 158 St. and adjoining locations. $45,500.

N. Y., St. George—Boro President Richmond Boro, Boro Hall, sanitary sewer reconstruction, Seaview Hospital, Dongan Hills, Richmond Boro. $390,000.

†**N. C., Bonnie Doone**—Town, sewerage sys., disposal plant, Docket N.C. 31-106. $71,000. **DPW.**

O., Delaware — Sanitary sewers. $60,000. Will apply for WPA gr. S. V. Long, Delaware, city engr.

O., Lorain — Incinerator plant. $100,000. H. F. Alexander, city engr.

★**O., Middletown** — Reconstructing Bull's Run sewer. $622,000. Federal grant sought. L. P. Diefenbach, city engr.

O., Toledo—Storm sewer, Airline Ave. and Federman St. **WPA.** $196,600. C. L. Piper, city engr.

†**Okla., Dawson**—Town, sanitary sewerage sys. and disposal plant, Docket Okla. 34-102. $72,600. **DPW.** Wood & Craig, Philtower Bldg., Tulsa, Okla., engrs. CD 10/9—ENR 10/16.

S. D., Sturgis—Enlarging sewage disposal plant. $45,000. Dakota Eng. Co., Mitchell, engr. Applied to DPW. CD 10/17.

S. D., Sturgis—M. J. Kerper, city and sewage plant imprv., enlargements, filter bed, 2 settling basins, reservoir, bldg. addns. $50,000.

Tenn., Humboldt—H. J. Foltz, mayor, new sewerage sys. $35,000.

★†**Tex., Brownwood**—City, W. Mayes, mayor, sanitary sewerage sys., collecting lines, $87,000, 35 ton incinerator, 4 in. c.i. water line, $48,000, Docket 41-117. **DPW.** J. Montgomery, Littlefield Bldg., Austin, engr. CD 9/30—ENR 10/2.

†**Tex., Freeport**—Town, exten., imprv. sanitary sewer collecting lines, etc., Docket Tex. 41-262. $104,877. **DPW.** H. G. Olmstead, Box 1016, Houston, engr. CD 10/7—ENR 10/9.

Tex., Freeport — Storm sewers. $256,010. Applied for DPW funds. H. G. Olmsted, Box 1016, Houston, engr.

Tex., Galena Park—R. DuBose, mayor, sewerage sys., disposal plant imprvs. DPW funds applied for. $59,019. H. G. Olmstead, Box 1016 Houston, engr.

Tex., Harlingen—H. Ramsey, mayor, sewage disposal plant imprvs., enlargement. $25,000. Applied for DPW funds. E. Tamm & Fitzgerald, Harlingen, engrs. CD 8/13—ENR 8/21.

Tex., Harlingen—H. Ramsey, mayor, storm sewerage sys. $172,000. Applied to WPA. $91,000 bonds voted. Tamm & Fitzgerald, 107 S. 1 St., engrs. CD 8/14—ENR 8/24.

†**Tex., La Marque** — Galveston Co. Water Control & Imprv. Dist. 3, sewerage sys., disposal plant, Tex. 41-266, $125,000. **DPW.** J. J. Rady, Majestic Bldg., Fort Worth, engr. CD 10/8—ENR 10/16.

★**Tex., San Antonio**—C. K. Quin, mayor, sanitary sewer mains to serve Army posts and Defense housing areas. $1,978,000. Applied for DPW gr. H. R. F. Helland & F. T. Drought, c/o Frost Bldg. J. W. Beretta Engineers, Inc., c/o NBCB, Matthews & Kenan, c/o Smith-Young Tower, and W. E. Simpson Co., c/o Milam Bldg., engrs.

†**Wash., Bremerton**—Kitsap Co., sewerage sys., Navy Yard City Dist., near here, Docket Wash. 45-152. **DPW.** $194,255. Parker & Hill, Smith Tower, Seattle, engrs.

Wis., Cross Plains—Sewage treatment plant, pumps, sludge collecting equip., piping, valves, etc., General Eng. Co., Portage, engr.

Wis., New Richmond—Rejected bids Sept. 26, sewage treatment and sludge disposal plant. Williams & Burlingame, Inc., 418 W. Willart St., Stillwater, Minn., engr. CD 10/8—ENR 10/16.

Man., Neepawa—Dom. Govt., Ottawa, Ont., sewage plant and sys. $40,000. Dpt. Munitions & Supply, Ottawa, Ont., engr.

Ont., London—University of Western Ontario, sewers, $25,000.

Ont., Peterborough—Bids early 1942, incinerator. $42,000. R. H. Parsons, City Hall, engr. CD 8/25—ENR 8/28.

BIDS ASKED

Bids Asked November 25

Conn., Stamford — Office, J. F. Connolly, comr. Finance, Town Hall Bldg., outfall sewers, sewage treatment plant and garbage incinerator; adv. ENR 10/23.

Bids Asked October 27

†**D. C., Wash.**—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., sanitary sewer, water, gas supply mains to Engineer Reproduction Plant and Storage Warehouse, Dalecarlia Reservation, Montgomery Co., Md.

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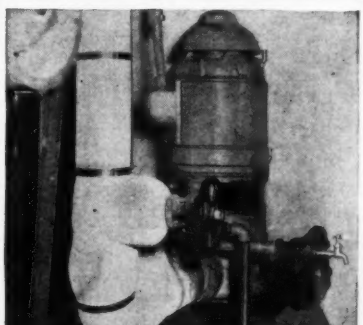

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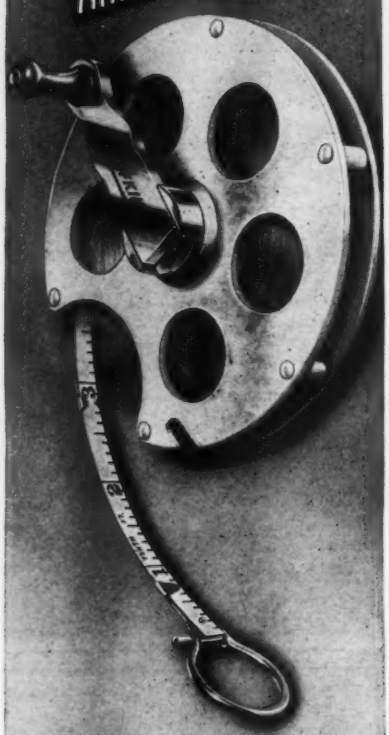

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TAPES · RULES · PRECISION TOOLS

SEWERS, etc. (Bids Asked, Cont'd.)

Bids Asked October 28

N. J., Keansburg—Mayor and Council, Municipal Hall, sewage treatment plant, appurtenances. R. A. Jessen, boro clk. L. P. Booz, 263 Madison Ave., Perth Amboy, consult. engr.; adv. ENR 10/23.

Bids Asked October 29

N. Y., Ballston Spa—Bd. Village Trustees, outfall sewer, c.i. force main and sewage pump, sewage disintegrator, imprv. sewage pump. station. Extended date. Solomon & Keis, 257 Bway., Troy, consult. engrs. D. D. Hall, village clk.; adv. ENR 9/30—ENR 10/2.

Bids Asked November 14

Pa., Jenkintown—Boro Council, A. C. J. Schabacker, secy., 4,500 ft. 6 and 8 in. sanitary sewer, Noble Vista Sect. G. B. Mebus, 112 S. Easton Rd., Glenside, boro engr; adv. ENR 10/23.

Bids Asked About November 15

O., Toledo—Bd. Comrs. Lucas Co., sanitary sewers to serve new American Propeller Co. plant, Laskey-Jackman Rd. areas. $300,000. B. S. Kesting, Toledo, co. engr. CD 6/25—7/3.

LOW BIDDERS

Calif., Los Angeles—City, Oct. 15, sanitary sewers, Mammoth Ave., from E. Green, 2825 W. Silverlake Dr. **$43,484.** Est. $34,522. CD 9/23—ENR 9/25.

†**La., De Ridder**—City, Oct. 10, portion sanitary sewer and water sys. serving defense housing unit, temporary sewerage treatment plant, Docket La. 16-102, from W. P. Aldrich & Co., Baton Rouge, **$32,475. DPW.** CD 10/2.

Md., Baltimore—Bd. Awards, City Hall, Oct. 15, storm water drains, from Guthrie & D'Adamo, 5014 Reisterstown Rd. **$62,328.** CD 10/8.

Wis., Hales Corners (P. O. R. 4, West Allis)—Sanitary Dist. & Addn. 1, sewage treatment plant, from Furton Bros., Menominee, Mich., **$83,200.** CD 9/30—ENR 10/2.

CONTRACTS AWARDED

Ill., LaSalle—Sewage treatment plant. **WPA. $274,000.** C. DeLeuw & Co., 20 N. Wacker Dr., Chicago, engrs.

N. J., Egg Harbor and **Galloway**—City of Atlantic City, City Hall, Atlantic City, storm drainage facilities for new airport, English Creek and Tilton Rds **WPA. $150,000.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

Tex., Corpus Christi—A. C. McCaughan, mayor, Bay front sewer lines from Fitzgerald to Buford Sts. and sewer lift station. **WPA.** approx. **$53,000.** G. Blackburn, city engr.

Tex., Edinburg—Laying sanitary sewer collecting lines, force account. **$25,000.** A. Tamm, Harlingen, engr.

Ont., Toronto—Sewers, West Don Roadway, to Commissioner of Works, City Hall, **$42,708.** CD 9/22—ENR 9/25, under LB.

Sask., Weyburn—Dpt. Natl. Defense for Air Ottawa, Ont., installing sewer and water sys., S. F. T. School, to Nelson River Constr. Co., Ltd., 607 Union Trust Bldg., Winnipeg, Man., **$54,000.**

BRIDGES, GRADE CROSSINGS

PROPOSED WORK

Ill., Newport — Vermilion Co., rein.-con. bridge across North Fork Vermilion River at north end of Lake Vermilion. $55,000. G. H. Baker, Centennial Bldg., Springfield, state engr. co. roads and city streets.

Missouri—State Hy. Comn., Jefferson City, two 12 ft. rein.-con. slab spans over Bentonville Branch, Sta. 379 plus 99.8, two 12 ft. rein.-con. slab span, culvert type bridge, Sta. 388 plus 6.69, same type bridge Sta. 412 plus 46.28, same type bridge Sta. 419 plus 81.74, all foregoing over Bentonville Branch, Powell, Mo.-Bentonville, Ark. Rd., McDonald Co. C. W. Brown, Jefferson City, engr.

N. Y., Brooklyn—President Brooklyn Boro, Boro Hall, railroad bridge over Rockaway Parkway. $100,000.

N. Y., Hollis—President Queens Boro, 120-55 Queens Blvd., Kew Gardens, bridge, 225 St. and Long Island R.R., $62,500; bridge, Brinkerhoff Ave. and Long Island R.R., $100,000.

★**N. Y., Long Island City**—Dpt. P. Wks., Municipal Bldg., New York, lift bridge over Newtown Creek (Vernon Ave. Bridge). $2,500,000.

N. Y., New York — President Manhattan Boro, Municipal Bldg., underpass under Battery Park, in connection with Brooklyn-Battery Park tunnel.

Oklahoma—State Hy. Dpt., Capitol, Oklahoma City, made preliminary plans bridge over Cedar Creek, farm-to-market road, near Bethel, McCurtain Co. $32,000. V. T. Moon, Capitol, Oklahoma City, engr.

Okla., Hartshorne—State Hy. Dpt., Oklahoma City, preliminary plans, overpass U. S. Hy. 270, west of here. $35,000. V. T. Moon, c/o owner, engr.

Pennsylvania—State Hy. Dpt., Harrisburg, 6 span 398 ft. continuous deck I-beam bridge, rein.-con. piers, abutments, abolish grade crossing, carry state hy. Route 17 over Erie R.R., Hoadleys, Wayne Co. $117,610. T. C. Frame, c/o owner, ch. engr.

Pennsylvania—State Hy. Dpt., I. S. Hughes, secy., Harrisburg, 3 span 160 ft. rein.-con. I-beam bridge, between Ephrata Twp. and East Cocalico Twp., Lancaster Co. $91,355. T. C. Frame, c/o owner, ch. engr.

★**Pa., Erie** — Steel, concrete viaduct over Penna. R.R. tracks, 6 and Wayne Sts., concrete subways under Penna. R.R. 12 St. and at Franklin and Downing Aves. $600,000. A. N. Aitkin, city engr.

Pa., Hokendauqua—Comrs. Lehigh Co., Allentown and Northampton Co., Easton, repairing, improv. bridge over Lehigh River between Hokendauqua and Tatasaqua. $36,000-$40,000.

Texas—State Hy. Dpt., B. P. Gentry, chn., Austin, bids soon Adams Bayou Bridge, 1.042 mi., Hy. 90, Orange Co.; Daffau and Little Daffau Creek bridges, 0.53 mi. Hy. 220, Erath Co. E. G. Wickline, bridge engr., Austin.

Tex., Beaumont—R. Edmonds, city mgr., concrete, steel vehicle bridge. $52,000. Applied for DPW funds. J. C. Reid, Beaumont, engr.

N. B., Centreville—Province of New Brunswick, Fredericton, 20x80 ft. bridge, 7 granite faced concrete arches, stone approaches. $50,000. Dpt. P. Wks., Fredericton, engr.

Que., Rock Island—M. Fregean, municipality clk., steel bridge. $35,000.

BIDS ASKED

Bids Asked October 27

Connecticut—State Hy. Dpt., W. J. Cox, Hartford, bridge over North Branch Salmon Brook, box culvert Monituck Lake, exten. storm sewer outlet, Rt. 10., Granby; bridge over Macedonia Brook, 550 ft. RBR gravel approaches Skiff Mt. Rd., Kent; two 64 ft. span rein.-con. rigid frame bridges, one 54 ft. span plate girder bridge over Huntington St., 9,343 ft. rein.-con. approaches, Thames River Bridge, New London; bridge over Causeway Brook, 550 ft. RBR gravel approaches, River Rd., sight line cut, River Rd., Saybrook.

Bids Asked October 29

Wyoming—State Hy. Comn., F. Kelso, supt., Cheyenne, 6 rein.-con. culverts, 2 rein.-con. culvert extens., etc. 8.626 mi. SN-FAP 58-A (4) 1942, Granger Junction-Green River Rd., US 30, Sweetwater Co.; 2 bridges, 8 rein.-con. culverts, FAP 209-C (6) 1942, Campbell Co.

Bids Asked October 30

Virginia—Dpt. Hys., Richmond, bridge, approaches, 1 mi. Rt. 17, SP S-595-AB1, Stafford Co.; 1 mi. Rt. 1 and Alt. 1, SP SN-FAP-1235-A, 225-B2; SN-FAP-183-W4, W5; SN-FAP-183-B1; SN-FAP-183-(3), Stafford and Spotsylvania Counties.

Bids Asked October 31

Fla., Miami—Bd. Comrs. Dade Co., Miami, filled causeway sections, part of Biscayne Causeway over Biscayne Bay. E. Friedman, co. engr.; adv. ENR 10/23.

Minnesota—State Hy. Dpt., St. Paul, Bridge 6412, SP 3307-08, Trunk Hy. 65-5, FAP 91-3, Kanabec Co.; Bridge 5998, SP 6920-05 (TH 53-11), FAP 379 F(3), St. Louis Co. J. T. Ellison, c/o owner, ch. engr.

Bids Asked November 3

Tex., Fort Worth — Tarrant Co., c/o D. Miller, judge, 4 rein.-con., steel bridges over Trinity River, White Settlement Rd. $177,500. Extended date. H. Cook, 1227 E. Richmond St., engr. CD 10/20—ENR 10/16.

Bids Asked November 5

Louisiana—State Dpt. Hys., Baton Rouge, overpass over Southern Pacific R.R., on Shreveport-Mansfield Hy., Keithville, Caddo Parish. Bids 9/24 rejected. CD 9/3—ENR 9/11.

New York—State Dpt. P. Wks., Div. Hys., Albany, bridges, Rensselaer, Saratoga, Steuben, Suffolk, Chemung and Steuben Counties; hys. in Albany and Onondaga Counties., adv. ENR 10/23.

Bids Asked About December 15

★**Pa., Rankin**—Comrs. Allegheny Co., R. G. Woodside, controller, Pittsburgh, 4,000 ft. steel bridge, approaches, etc. $3,500,000. Levi Burd Duff, County Office Bldg., Pittsburgh, engr. CD 7/17—ENR 7/24.

LOW BIDDERS

D. C., Wash.—Dist. Comrs., District Bldg., Wash., D. C., Oct. 9, bridge over Tidal Basin, 14 St. S.W., from Cayuga Constr. Corp., 30 Vesey St., New York, N. Y. **$275,961.** Est. $162,000. CD 9/22—ENR 9/25.

★**Kentucky** — Dpt. Hy., Frankfort, superstructure bridge, Lexington-Richmond Rd., Fayette Co., from Mt. Vernon Bridge Co., Mt. Vernon, O., **$464,02*****substructure bridge, Carrollton-Louisville Rd., Carroll Co., from Missouri Valley Bridge & Iron Co., Leavenworth, Kan., **$217,037 ***** superstructure for same bridge, from Illinois Steel Bridge Co., Jacksonville, Ill., **$210,768.** CD 9/25—ENR 9/25.

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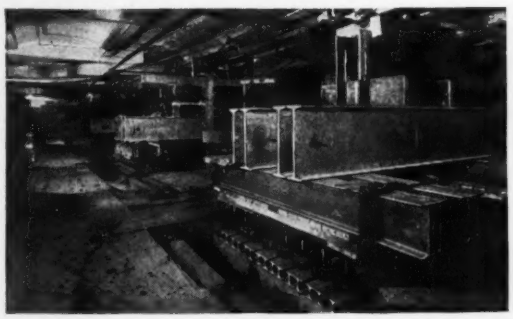

This photograph illustrates shoring done to temporarily support a line of extremely heavy column loads for installation of heavier foundations—an extensive underpinning job

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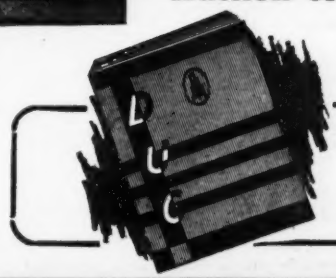

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ATLANTIC STEEL COMPANY
1775 BROADWAY, NEW YORK

BRIDGES, etc. (Low Bidders, Cont'd.)

Louisiana—Dpt. Hys., Baton Rouge, Oct. 15, bridge, surfacing 2.182 mi. Tangipahoa Parish, from Robinson & Young, Louisiana Natl. Bank Bldg., Baton Rouge, **$81,978.** CD 9/26—ENR 10/2.

★**New York**—A. W. Brandt, supt. P. Wks., Albany, Oct. 8, railroad grade crossing elimination, bridge work, Orange Co., from Frea Berlanti & Son, Inc., 15 Oakland Ave., Harrison, **$206,377*****Suffolk Co., from Andrew Weston Co. Inc., 158 Irving Pl., Woodmere, **$93,726*****FARC 41-45, Steuben Co., from L. E. Cleghorn, 70 Edgemont Rd., Rochester, **$70,-817*****FARC 41-38, Steuben Co., from Howes & Farrell, Inc., Oneida, **$105,269*****Schenectady Co., from John Arborio, Inc., West Cedar St., Poughkeepsie, **$219,505.** CD 9/18—ENR 9/25 under Roads.

Virginia—Dpt. Hys., Richmond, Oct. 14; 2 bridges, Augusta Co., from Pochantas Constr. Co. Inc., Lewisburg, W. Va., **$26,853.** CD 10/2—ENR 10/9, under Roads.

CONTRACTS AWARDED

Alabama—C. J. Sherlock, engr. State Hy. Dpt., Montgomery, steel superstructure 0.251 mi. Foster's Ferry Bridge, near Tuscaloosa, to Virginia Bridge Co., 3900 8 Ave., Birmingham, **$169,200;** overpass over Central of Georgia R.R., Talladega Co., to S. R. Batson, 2301 Hollywood Blvd., Birmingham, **$73,211.** CD 10/2—ENR 10/9.

Ill., Cicero — Repairing bridge, to Morris Handler Co., Inc., 2718 W. Chicago St., Chicago. **$51,895.** C. DeLeuw & Co., 20 N. Wackar Dr., Chicago, engr.

N. J., Princeton—Pennsylvania R. R. Co., W. D. Wiggins, ch. engr., Broad St. Station Bldg., 1617 Pennsylvania Blvd., Phila., concrete, steel bridge over State Hy., to Braun & Stewart, Broad St. Station Bldg., Phila., Pa.

★**Ohio**—State Hy. Dpt., Columbus, reconstructing existing separated crossing with New York Central R.R., consisting of 4 track deck type steel girder underpass structure, grading, etc., Cuyahoga Co., to National Eng. & Contg. Co., W. 4 St. and Central Ave., Cleveland. **$574,903;** 0.142 mi. continuous steel beam bridge, over Miami River, paving, etc. Shelby Co., to C. R. Boulton, 10 E. Town St., Columbus, **$72,241.** Bids 10/14. CD 10/1—ENR 10/9, under Roads.

Oklahoma — State Hy. Comn., Oklahoma City, bridges over North Canadian River, Shawnee, Pottawatomie Co., to Ottinger Bros. Co., Hinton, **$187,110** est. $189,214***bridges, Grant Co., to Mills Constr. Co., Woodward, **$69,552** est. $61,286***bridges, near Thomas, Custer Co., to Lee Pool, Fairview, **$29,710** est. $32,664***bridges, northeast of Custer City, Custer Co., to El Reno Constr. Co., El Reno, **$56,145** est. $56,638***overpass over Missouri Pacific Lines, Wagoner Co., to Moran & Buckner, Muskogee, **$63,106** est. $65,456. Grand total $405,623. CD 9/29—ENR 10/2.

Pa., Pittsburgh—Bd. Comrs. Allegheny Co., R. G. Woodside, controller, relocation Painters Run Rd., Bridge Co. 1, widening, reconstruction Upper St. Clair Twp., to John Carson & Son, 1248 Pennsylvania Ave. **$34,567.** L. B. Duff, County Office Bldg., Pittsburgh, engr.

†**Tex., San Antonio**—U. S. Eng., Federal Bldg., Galveston, rein.-con. vehicle bridge across Leon Creek, to C. H. Harrison, Amicable Bldg., Waco. **$25,490.** Est. $30,000. Bids 10/10. CD 10/6.

Vt., Stowe—H. E. Pike, town clk., Town Hall, 2 span I-Beam bridge, gravel and refined tar approaches, to Thomas J. Harvey & Son, Adams, Mass., **$32,629.** CD 8/21.

STREETS AND ROADS

BIDS ASKED

Bids Asked October 27

Connecticut—State Hy. Dpt., W. J. Cox, comr., Hartford, bit. con. retread paving 4,149 ft. Hartford Ave. and Stanley St., New Britain; 7,809 ft. bituminous macadam or Colprovia Process asphaltic concrete paving parts Weed St. and Wahackme Rd., New Canaan; RBR gravel surfacing 2,604 ft. part Coleman Rd., Glastonbury. Over $25,000.

Bids Asked October 28

N. Y., New York—President Bronx Boro, Bronx County Bldg., 851 Grand Concourse, sheet asphalt and granite block repaving E. 170 St.; sheet asphalt on concrete paving Morris Ave., etc.

West Virginia—State Road Comn., Charleston, bituminous leveling course, rock asphalt on macadam surfacing 0.53 mi. State Route 61, SP 3694, Fayette Co.; grading, draining, concrete paving 1.47 mi. Route U.S. 250, Mannington-Flat Run Rd., FAP FA 180-E(1), Marion Co.; 1.266 mi. 7 St., Parkersburg, FAP FA 143-1(1), Wood Co.; grading, draining, gravel or slag surfacing 3.181 mi. Route Alt. U.S. 50, Pike-Pleasant Co. line Rd., FAP FA 247-D(1), Ritchie Co.

Bids Asked October 29

Wyoming—State Hy. Comn., F. Kelso, supt., Cheyenne, grading, draining, base course surfacing, stone ship seal coat, 1 treated timber bridge, 2 rein.-con. culverts, etc., 2.564 mi. FAS 4-C (1) 1942, Urie-Carter Rd., Uinta Co.; grading, draining, etc., 18.699 mi. FAP 209-C (6) 1942, Gillett-Douglas Rd., Campbell Co.; 8.626 mi. SN-FAP 58-A (1) 1942, Granger Junction-Green River Rd., S. 30, Sweetwater Co.; base course surfacing 16.782 mi. SP 2044, Rock Springs-Hiawatha Rd., Sweetwater Co.

★**Texas**—D. C. Greer, engr. State Hy. Dpt., Austin, grading, drainage structures, 2.832 mi. U. S. Hy. 271, CWR-221-3-12, Red River Co., $40,000; 6.931 mi. U. S. Hy. 81, FAP 41(3) and 14(8) Tarrant and Wise Counties, $40,000; 4.177 mi. U. S. H. 6, 90, and State 87, FAP 142-ABC(4), Orange Co., $80,000; 4.248 mi Hy. 73, FAP 1039-C(1), Harris Co., $80,000; grading, drainage structures, flexible base, asphalt surface treating 5.881 mi. U. S. Hy. 290, FAP 193-(4), Kimble Co., $160,000; grading, drainage structures, select material surfacing 8.712 mi. U. S. Hy. 87, FAP 46-A(2), Gillespie Co., $120,000; grading, flexible base, base preservative, 7.513 mi. Hy. 117, FAS 662-E(1), Lipscomb Co., $60,000; 12.71 mi. hy. 117, FAS 662 A(2), Ochiltree Co., $140,000; asphaltic concrete and concrete on concrete paving 6.928 mi. U. S. Hy. 271, FAP 172 (6), 296 (5) and 343 A, Lamar Co. $200,000; grading, exten. culverts, flexible base, select material surfacing 20.723 mi. Lipscomb and Ochiltree Counties, $200,000; grading, double asphalt surface, flexible surface treating 30.277 mi. Hy. 15, Control 295-2 and 3-4, 4, 3 x 4, Borden Co., $200,000; concrete paving 4.853 mi. U. S. Hy. 271, FAP 147 (7), Smith Co., $200,000; grading, drainage structures, flexible base 4.03 mi. U. S. Hy. 77, Lee Co., $40,000; flexible base, prime coat and seal coat surfacing 6.898 mi. Hy. 110, Cherokee Co., $40,000; roadside development 32.476 mi. U. S. Hy. 90 and State 73, Fayette and Colorado Counties, $20,000; flexible base, asphalt surface treating 8.544 mi. Hy. F, FAP 58-A(2), Atascosa Co., $80,000; 5.776 mi. Hy. 67 Control Nos. 257.5 and 4.5 and 5, Comanche and Erath Counties, $80,000.

Bids Asked October 30

Nebraska—State Dpt. Roads & Irrigation, Lincoln, sand graveling Carleton-Plymouth Rd., Patrol 11022, Dunbar-Talmage and Lorton West, Patrol 11048 and 11062; Gretna-Fort Crook, Patrol 21-038; Magnet South, Patrol 31003; Benkelman-Imperial, Patrol 61007; Ogallala-Hyanis Rd., Patrol 71037 and 71043; Grainton and Wallace, Patrol 71041; 2 mi. Lorton West Rd., FAS 32-C; bridge, Big Springs SW, FA 287-B. W. G. Scott, Lincoln, state engr.

N. Y., Kew Gardens—President Queens Boro, Queens Boro Hall, 120-55 Queens Blvd., recut granite block and new granite block repaving Crescent St.; asphaltic concrete paving, on new or existing concrete fdn. 35 Ave.; asphaltic concrete on concrete paving 27 (Goodrich) St.; sheet asphalt on new or existing concrete fdn., 37 Ave., Linden Pl.; recut granite block, and new granite block paving, sheet asphalt on new or existing concrete fdn., Thomson Ave.

N. Y., New York—President Manhattan Boro, Municipal Bldg., sheet asphalt repaving E. 32 and E. 42 Sts.

Virginia — Dpt. Hys., Richmond, waterbound macadam paving 1.5 mi. Rt. 50, SP S-32-AR1, Fairfax Co.; 1.6 mi. Rt. 460 and 40, SP S-336-LR1, M2; S-1050-M1, D, Nottoway Co.; 1.2 mi. Rt. 64, SP FAS-327-M3, AR1; S-327-M2; and FP FAS-527-D (1), Wise and Russell Counties; concrete bit. paving 0.2 mi. Rt. 211, SP S-292-M2, Fairfax Co.; rein.-con. paving 1 mi. Rt. 299, SP S-1299-A, Prince George Co.; gravel surface treating 1.4 mi. Rt. 218, SP S-782-E2, Stafford and King George Counties; soil surface treating 0.8 mi. Rt. 301, SP S-1000-A1, 2, M1, Caroline Co.; grading, drainage 1 mi. Rt. 134, SP S-1274-A, Prince Edward Co.

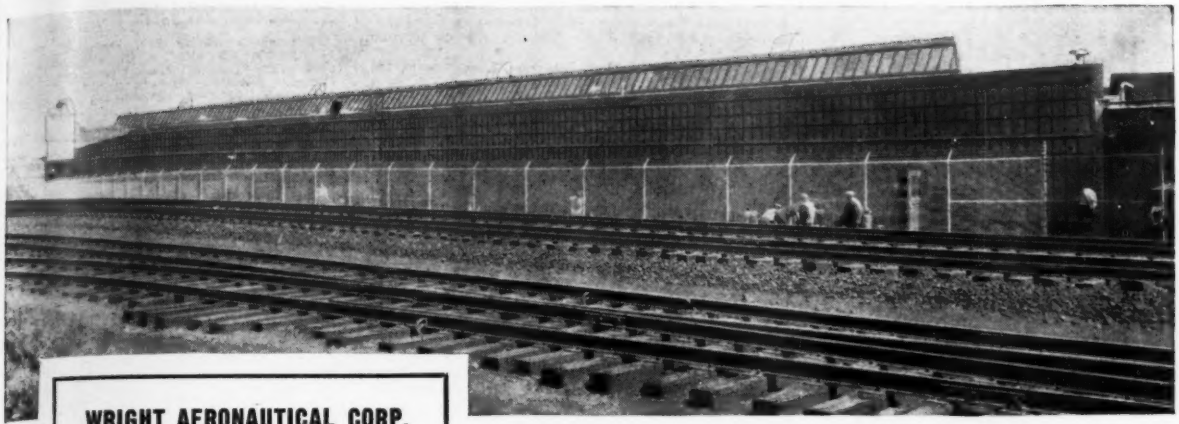
Bids Asked October 31

Arizona—State Hy. Comn., Phoenix, grading, draining, aggregate base course, special bituminous surface treatment 4 mi. Flagstaff-Ft. Valley Hy., FAS 24-A (1) (1942). Over $50,000. W. R. Hutchins, Phoenix, engr.

Idaho—A. C. Merritt, comr. P. Wks, Boise, roadbed, drainage structures, crushed rock surfacing 1.063 mi., Coeur D'Alene-Yellowstone Trail Hy., SN FAP 73-A(5), Shoshone Co.; roadbed, drainage structures, crushed gravel surfacing 2.829 mi. Colburn-Culver Rd., Idaho FASP 16-C (1) Bonner Co.

Kentucky—Dpt. Hys., Frankfort, high type surfacing 0.91 mi. main street, Richmond from Sunset Ave. to entrance to Cemetery, SP 76-51; SP 76-151, Madison Co.; triple 10x6 con. culvert at State Road Fork, Salyersville-Prestonsburg Rd., 0.3 mi. east Magoffin Co. line, SP 36-156, Floyd Co.

Minnesota—State Hy. Dpt., St. Paul, sand gravel fill, stabilized gravel surfacing, culvert 4.9 mi. SP 1306-03 (Trunk Hy. 95-132) FAS 536D(2); graveling, grading 3.1 mi. SP 2307-06 FAP 91(3); cograveling, culvert, 5.9 mi. SP 4602-02 (TH 4-84); stabilized gravel surfacing, concrete box culverts 7.1 mi. SP 5307-02 (TH 91-91); grading, Bridges 5924 and 5925, 12.7 mi. SP 38-201-04 Forestry Proj. 15D; grading, gravel base, concrete box culvert extens. 9.3 mi. SP 5005-21 (TH 56-81), SP 5005-20 (TH 56-81) and SP 2312-02 (TH 56-81, FAS 496A(4) and 496B(4); bituminous surfacing, mineral aggregate surfacing 1.2 mi. SP 7101-12 (TH 10-3) SN-FAP 44(4); crushed rock surfacing 3.7 mi. P. 85-502-02, FAS 185A(1), 2.1 mi. P. 35-504-02 FAS 180A(1), both Winona Co.; signal installation P. 10-504-01 FAGM 153A(1), Carver Co.; P. 70-501-01, FAGM



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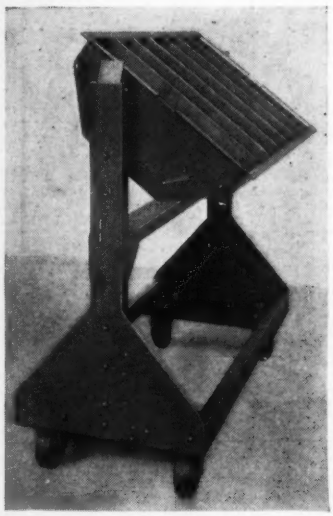

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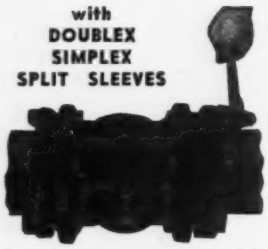

Last bolt being tightened in completed joint.

First bolt being placed to hold split sleeve in position.

One of end gaskets being placed in position.

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STREETS, etc. (Bids Asked, Cont'd.)

154A(1) Scott Co.; P. 14-501-01 FAGS 163A (1), Clay Co. J. T. Ellison, c/o owner, ch. engr.

New Jersey—E. D. Sterner, comr. State Hy. Dpt., Trenton, paving 2.846 mi., Route 28, Sect. 22 A, Hunterdon Co.

Bids Asked November 3

Ill., Decatur—Macon Co., grading, culverts 2.441 mi. Sect. 2A-MFT. G. H. Baker, Centennial Bldg., Springfield, state engr. co. roads and city streets.

Bids Asked November 7

Kentucky—Dpt. Hy., Frankfort, grading, draining, low type surfacing, 2.514 mi. Newport-Maysville Rd., SP 19-31, Campbell Co.; 4.428 mi. Hazard-Chavies Rd., FAS 45 A (1) SP 97-162, Perry Co.

New Jersey—E. D. Sterner, Comr. State Hy. Dpt., Trenton, grading, paving, 1.98 mi. Route 44, Sect. 12, Pennsville to Hook Rd., Salem Co.; adv. ENR 10/23.

Bids Asked November 10

Wis., LaCrosse—Grading various streets and alleys. J. H. Barth, city engr.

Bids Asked

Calif., San Bruno—Grading, armor coat on crusher run surfacing, vitr. sewers with sulphur silicate joints, Mills Park Sun Division 2. $25,000.

Ill., Decatur—Macon Co., imprv. 13½ mi. roads, $115,000.

Louisiana—State Dpt. Hys., Baton Rouge, received no bids Oct. 15, imprv. 0.977 mi. Route 754, Pine and Thomas, Proj. 913-04-38, Washington Parish. CD 9/26—ENR 10/2.

†**Montana**—Pub. Roads Admin., Missoula, rejected bids Oct. 10, grading, surfacing 4.2 mi. Yellowstone Trail Hy., Cabinet National Forest, Mineral Co. Will readvertise. CD 10/2.

N. J., Kearny—Western Electric Co., Inc., 100 Central Ave., grading, concrete roads, sewers, street lighting, etc. Central Ave. C. T. Siebs, c/o owner, engr.

Wisconsin—State Hy. Comn., Madison, rejected bids Sept. 30, grading, draining 9.223 mi. Wisconsin Dells-Portage Rd., Columbia Co.; grading, draining, graveling 11.626 mi. Ladysmith-Prentice (Glen Flora-Hawkins) Rd., Rusk and Price Counties; grading, draining, graded aggregate surfacing 9.007 mi. Prairie du Chien-La Crosse (Lynxville-DeSoto Section) Rd., Crawford Co. CD 9/26—ENR 10/2.

LOW BIDDERS

California—State Hy. Dpt., at office C. H. Purcell, state hy. engr., Los Angeles, Oct. 16, imprv. 0.7 mi. Los Angeles Co., from J. E. Haddock, Ltd., 3578 E. Foothill Blvd., Pasadena, **$43,814*****0.8 mi. slope protection, Ventura Co., from J. S. Metzger & Son, 3045 Gilroy St., Los Angeles, **$59,875.** CD 9/29 and 10/6 respectively—ENR 10/2.

†**Calif., Camp Roberts**—Con. Q.M., 80,000 sq. yd. Class A paving (7.7 mi.) access roads, from Doudell Constr. Co., P. O. Box 488, San Jose. **$44,000.**

Calif., Stockton—City, Oct. 6, imprv. Arcade, Noble and Alice Sts., from S. M. McGaw, 425 Lexington Ave., **$25,472.** CD 9/22.

Colorado—State Hy. Dpt., Denver, Oct. 9, imprv. 10.641 mi. Moffat Co., from U. S. Siegrist, 1428 S. University Blvd., Denver, **$86,600**; imprv. 1.155 mi. El Paso Co., from L. Pinello, Fountain Rd., Colorado Springs, **$49,696.** CD 9/30—ENR 10/2.

Colorado—State Hy. Dpt., Denver, Oct. 14, imprv. 3.486 mi. Conejos Co., from Driscoll Constr. Co., 220 S. Main St., Pueblo, **$52,235.** CD 10/7.

Connecticut—State Hy. Dpt., Hartford, Oct. 14, imprv. 11,467 ft. Berlin-Newington, from Lane Constr. Co., 35 Colony St., Meriden, **$109,866**; 9,900 ft. Stonington, from Frank Palazzi & Sons, Inc., 2321 Hartford Ave., Johnston, R. I. **$26,168.** CD 10/3—ENR 10/9.

Ill., Tuscola—Douglas Co., Oct. 6, gravel or crushed stone surfacing, 3 span steel I-beam bridge, 2.0432 mi. Sect. 18 MFT, from General Paving Co., Champaign. **$33,190.** CD 9/30.

★**Kentucky**—Dpt. Hy., Frankfort, Oct. 10, imprv. 3.075 mi. Boone Co., from K. V. Johnson & H. L. Johnson, Bowling Green, **$45,780*****0.274 mi. Bourbon Co., from H. C. Adams, Lexington, **$26,342*****8.279 mi. Clinton Co., from Nally & Mudd, Springfield, and Cumberland Constr. Co., Burkesville, **$243,889*****0.702 mi. Greenup Co., from Nally & Mudd, Springfield, **$58,476*****1.770 mi. Johnson Co., from J. M. Cain Co. Inc., Huntington, W. Va., and R. R. Dawson, Bloomfield, **$127,080*****1 mi. Warren Co., from G. H. Cheek, Frankfort, **$130,022.** Received no bids Oct. 10, imprv. 2.029 mi. SP 27-146, 6.25 mi. SP 27-126, both Clinton Co. CD 9/22—ENR 9/25.

Louisiana—Dpt. Hys., Baton Rouge, Oct. 15, imprv. 0.586 mi. Cameron Parish, from Norman Constr. Co., Lake Charles. **$29,382.** CD 9/23—ENR 9/25.

Md., Baltimore—Bd. Awards, City Hall, Oct. 15, imprv. streets, Bur. Hys. Contr. CC 753, from Arundel Constr. Co., 910 Tra... St. **$28,441.** CD 10/6—ENR 10/9.

Minnesota—State Hy. Dpt., St. Paul, Oct. 10, imprv. 6.9 mi. hy. SP 4[illegible]-02 & 73[illegible] and SP 4711-06, from Mc[illegible] Bros. Cloud. **$84,308.** Rejected bids 10/10, imprv. 1.2 mi. SP 6903-01, SP 6901-0[illegible] and SP 6913-0[illegible] 4.9 mi. SP 6931-02. CD 9/[illegible]—ENR 10/2.

†**Ore., Pendleton**—U. S. Eng., 628 Pittock Blk., Portland, Oct. 11, sidewalks, curbs, surfacing street shoulders, Air Base from Newport Constr. Co., 7031 N.E. Halsey St., and Kern & Kibbe, 42 S.E. Salmon St., Portland. **$28,070.** Est. $11,970.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, Oct. 17, imprv. 38,696 ft. [illegible] 2 rein.-con. structures, 2 plate girder, 2 rein.-con. and 2 overpass bridges, Lancaster Co., from C. W. Good, Inc., 726 Columbia Ave., Lancaster. **$839,676.** CD 10/7—ENR 10/9.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, Oct. 17, imprv. 1,396 ft. Allegheny Co., from McShane Contg. Co., Inc., 100 Baldwin Rd., Pittsburgh, **$28,346*****4,500 ft. Lycoming Co., from Windber Constr. Co., Inc., Midway St., Windber, **$89,311*****18,348 ft. Northumberland Co., from J. H. Swanger, Breneman Bldg., Lancaster, **$253,488*****21,[illegible] ft. Lycoming Co., from Stewart Contg. Co., P. O. Box 112, Hazleton, **$357,584*****2,728 ft. Luzerne Co., from Jos. Banks Constr. Co., Central Bldg., Wilkes-Barre, **$133,817*****1,[illegible] ft. Montgomery Co., from Union Paving Co., 1227 N. Broad St., Phila., **$379,855.** CD 10/[illegible]—ENR 10/9.

★**Virginia**—Dpt. Hys., Richmond, Oct. 14, imprv. 0.75 mi. Lee Co., from C. D. and C. P. Fugate, Wise, **$38,690*****1.3 mi. Hanover and Henrico Counties, from Hechler Bros., Highland Springs, **$114,770*****[illegible] mi. Fauquier Co., from Blackwell Eng. & Constr. Co., Warrenton, **$49,503*****3 mi. Mecklenburg Co., from R. K. Williams, Belleville, and Monroe Sts., Richmond, **$101,290*****4.6 mi. and 2.2 mi Mecklenburg Co., from G. P. Clay, Box 481, Richmond, **$127,871** and **$51,193** respectively *** 3.2 mi. Rockbridge Co., from Echols Bros., Inc., Staunton, **$130,016*****[illegible] mi. Brunswick Co., from Bowers Constr. Co., 805 W. South St., Raleigh, N. C., **$37,715***** 10 mi. Powhatan Co., from Sam Finley, Inc., Box 2389, Roanoke, **$220,846.** CD 10/2—ENR 10/9.

CONTRACTS AWARDED

†**Ala., Mobile**—U. S. Eng., Federal Bldg., paving streets and warehouse area, Inv. 346-42-185, to Foster & Creighton, Amer. Nat. Bank Bldg., Nashville, Tenn., **$124,735.** CD 9/23.

Ark., Osceola—R. Green, judge Mississippi Co., imprv. roads, **WPA. $293,556.**

†**Calif., King City**—Con. Q.M., Camp San Luis Obispo, access road to target area in Hunter Liggett Military Reservation, near Jolon, Inv. 8, to Calowell Constr. Co., 1401 E. Wardlow Rd., Long Beach. **$88,895.** CD 10/8—ENR 10/16, under LB.

Calif., South San Francisco—Imprv. 4,[illegible] ft. Grand Ave., to Union Paving Co., 310 California St., San Francisco. **$25,989.** Bids 10/6. CD 10/1.

Calif., Visalia—Imprv. W. Mineral King St. to G. E. France, 1205 N. Court St. **$64,596.** Subject to approval State Div. Hys. Bids 10/6. CD 9/22.

Fla., Sebring—Highlands Co., bituminous asphalt surfacing 2 access roads, one 2.08 mi. and other 2.03 mi., near here, to connect existing state hys. with new Army Air Training School. **WPA. $181,173.**

Ill., Cicero—Paving streets, to Leininger Constr. Co., 30 N. La Salle St., Chicago, **$26,823.** C. DeLeuw & Co., 20 N. Wacker Dr., Chicago, engrs.

Ill., Evanston—Concrete paving, to Contracting & Materials Co., 1235 Dodge St., **$25,000.**

Ia., Davenport—Scott Co., imprv. hys. **WPA. $69,960** allot.

Ia., Fort Madison—Paving 20 blocks, to Hargrave Constr. Co., Cedar Rapids. **$28,650.**

Ia., LeMars—Plymouth Co., graveling roads, to Hartsell & Evans, Early, **$45,696.** E. E. Nelson, co. engr.

Kansas—State Hy. Comn., Concordia, imprv. 2.876 mi. FA 185 B and 2.256 mi. FA 185 D, Cloud Co., to List & Clark Constr. Co., 414 Railway Exch. Bldg., Kansas City, Mo., **$66,739** and **$33,593** respectively***7.1 mi. Dickinson Co., to Geiger & Rutherford, Leavenworth, **$49,829*****concrete paving 2.876 mi. FA 185 B and 2.256 mi. FA 185 D, Cloud Co., to Stannard Constr. Co., 428 Rock Island St., Wichita, **$78,426** and **$64,297** respectively. Grand total $292,884. CD 9/16—ENR 9/18.

Mich., Dearborn—Wayne Co. Rd. Comm., 3800 Barlum Tower, Detroit, concrete paving, curbing Cherry Hill Rd. from Military to Outer Dr., to Denton Constr. Co., 4255 General Motors Bldg., Detroit. **$25,000.**

Montana—State Hy. Comn., Helena, 20 mi. roads out from Columbus, Stillwater Co. **WPA. $96,317.**

Nevada—Directors Dpt. Hys., Carson City, imprv. 4.8 mi. Elko Co., to Nevada Rock &

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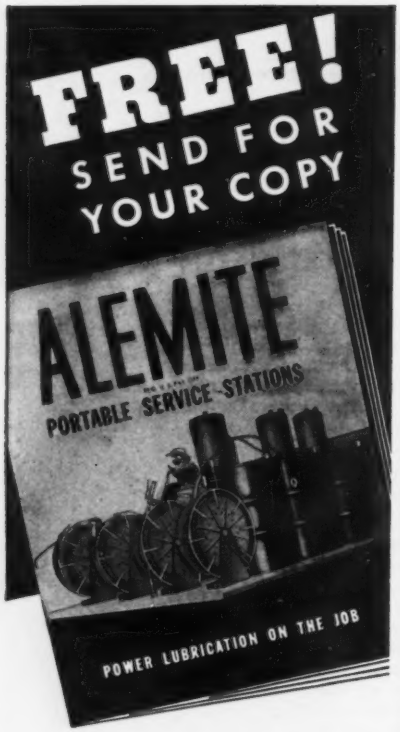

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STREETS, etc. (Contracts Awarded, Cont'd.)

Sand Co., Inc., Box 1626, Reno. **$75,798.** Bids 10/9. CD 10/1.

N. J., Atlantic City—Grading, paving Missouri, Mississippi and Maryland Aves., **WPA. $50,771;** grading, concrete sidewalks, **WPA. $51,500.** G. R. Swinton, 930 Atlantic Ave., owner's and WPA engr.

†N. J., Cape May—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., grading, rein.-con. and bituminous concrete surfacing streets, Cape May Naval Air Station, **WPA. $94,953.**

N. J., Carteret—13,720 sq. yd. 7 in. modified penetration macadam surfacing, concrete curbs, concrete sidewalk, resetting bluestone curb, storm sewers, etc., **WPA. $62,792.** J. H. Weitzen, Smith and Holbart Sts., Perth Amboy, owner's and WPA engr.

N. J., Egg Harbor—Grading, concrete sidewalks, curbs various streets, constructing playground Baltimore Ave., **WPA. $53,921.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

†N. J., Fort Dix—Con. Q.M., grading, gravel base, oil surfacing roads, **WPA. $50,020.** W. D. Cougle, 1102 S. Broad Sts., Trenton, owner's and WPA engr.

†N. J., Fort Monmouth—Con. Q.M., grading, 5 in. penetration macadam paving 4 mi. Hartshorne Rd. **WPA. $73,347.** W. D. Cougle, 1102 S. Broad St., Trenton, owner's and WPA engr.

N. J., Hammonton—Grading, concrete sidewalks, curbs, gutters, **WPA. $72,962.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

N. J., Jersey City — Hudson Co., Court House, grading, 3 in. sheet asphalt on 7 in. concrete paving. **WPA. $56,000.** F. Radigan, Court House, WPA and co. engr.

†N. J., Metuchen—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., grading, 7 in. penetration macadam paving Raritan Arsenal. **WPA. $55,000.** J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, WPA and owner's engr.

N. J., Newark—Street Dpt., City Hall, grading, 3 in. asphalt on 6 in. concrete surfacing, resetting curbs, etc., Avon Pl. from Avon to Waverly Aves. **WPA. $77,100.** G. Andress, City Hall, WPA and city engr.

N. J., Newark—Essex Co. Park Comn., 115 Clifton Ave., grading, bituminous on telford paving, paths, bridal trails, various parks. **WPA. $88,098.** R. D. Crater, 115 Clifton Ave., WPA and owner's engr.

N. J., New Brunswick—Grading, 1½ in. T. surface on 6 in. penetration macadam paving, concrete curbs, **WPA. $53,907.** J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, owner's and WPA engr.

†N. J., Pedricktown—War Dpt., 20 St. and Constitution Ave., N.W., Wash., D. C., grading, gravel surfacing roads, Delaware Ordnance Depot, **WPA. $52,500.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

†N. J., Salem—Con. Q.M., penetration macadam and bituminous concrete on stone resurfacing, guttering, concrete curbing roads, Fort Mott, **WPA. $71,735.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

N. J., Spotswood and **Raritan**—Middlesex Co., Court House, New Brunswick, 10,000 ft. concrete curb and gutter, County Rd., Spotswood, grading, landscaping grounds Roosevelt Hospital, Raritan, **WPA. $53,959.** J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, owner's and WPA engr.

N. J., Ventnor—Grading, concrete sidewalks, curbs and gutters, **WPA. $58,730.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

N. J., Vineland—Landis Twp., Twp. Hall, sidewalks, driveways, curbs, gutters, imprv. streets, **WPA. $70,500.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

N. J., Woodbine—Grading, sidewalks, **WPA. $50,600.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

New Mexico—B. G. Dwyre, engr. State Hy., Dpt., Santa Fe, imprv. 9.943 mi. Union Co. and 6 mi. Quay Co., to A. O. Peabody, Santa Fe, **$83,789** and **$59,705** respectively; est. $75,000 and $65,500 respectively***5.067 mi. San Juan Co., to Brown Bros., Albuquerque, **$143,598,** est. $150,000. Grand total $287,092. CD 10/3.

†N. M., Albuquerque—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., sidewalks, oiling roads, parking areas, re-seeding, Army Air Base. **WPA. $95,744.**

Ohio—State Hy. Dpt., Columbus, imprv. 1.76 mi. Lorain Co., to Ohio Eng. Co., 105 6 St., Lorain, **$77,538,** est. $84,200; 6.157 mi. Clinton Co., to Fritz-Pyle Constr. Co., 1400 N. Grant Ave., Columbus, **$46,772,** est. $49,800. Bids 10/14. Received no bids 10/14, imprv. 0.433 mi. Columbiana Co., $35,400; 0.08 mi. Ashtabula Co., $9,800. CD 10/1—ENR 10/9.

O., Ashtabula—W. H. Flower, city mgr., street imprvs. **WPA. $185,885.**

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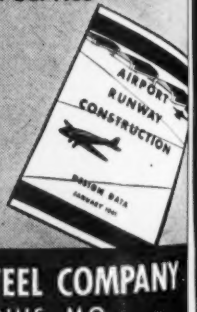

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STREETS, etc. (Contracts Awarded, Cont'd.)

O., Cincinnati — Widening, repaving Plum St. from Central Pkwy. to Fourth St., to Foley Constr. Co., Boudinot St. **$68,461.** Est. $78,222. Awarded 10/9. H. H. Kranz, City Hall, engr.

Oklahoma—State Hy. Comn., Oklahoma City, improv. 5.755 mi. Mayes Co. and 5.98 mi. Nowata Co., to Richards & Mullinix Co., 1401 W. 5 St., Oklahoma City, **$57,566** and **$47,911** respectively, est. $70,952 and $57,542 respectively***5.865 mi. Ellis Co., to Mills Constr. Co., Woodward, **$69,348,** est. $95,232 ***6.971 mi. Grady Co., to Midwest Materials Co., Cotton Exch. Bldg., Oklahoma City, $54,573, est. $61,463***5.857 mi. Grant Co., to J. J. Thompson, 204 N.W. 33 St., Oklahoma City, **$53,644,** est. $58,234***5.015 mi. Custer Co., to G. E. Keck, Fairview, **$33,231,** est. $42,287***6.162 mi. Osage Co., to Ryan & Beekman, 2100 East Park St., Oklahoma City, $34,107, est. $34,609. Grand total $350,379. V. T. Moon, Oklahoma City, engr. Bids 10/14, awarded 10/16. CD 9/29—ENR 10/2.

†**Okla., Fort Sill**—Con. Q.M., access roads in military area, to Park-Ward Co., 808 E. 17 St., Oklahoma City. **$83,928.**

★**Pennsylvania**—State Hy Dpt., Harrisburg, rein.-con. paving, surfacing, 3 rein.-con. structures, 2 rein.-con. bridges, etc., Adams Co., to Hempt Bros., R.D. 1, Camp Hill, $679,630. Bids 9/26, awarded 10/15. CD 9/29—ENR 10/2 under LB.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, impry. 12,355 ft. hy., 2 rein.-con. bridges, Indiana and Cambria counties, to Laub & Collins, P. O. Box 8606, Wilkinsburg, **$529,205.** Bids 10/3, awarded 10/14. CD 10/6—ENR 10/9 under LB.

Pa., Charleroi—Virginia McVay, city secy., grading, paving, curbing, sidewalks, **WPA. $150,000.** McDonald & Bigler, Menlo Theatre Bldg., engr.

Pa., East Bangor—Boro Council, bituminous on stone paving, own forces. **$25,000.**

Tenn., Gate City—Judge Scott Co., widening 6 mi. hy. from Moccasin Gap to Kingsport Hy. **WPA. $217,480.** H. L. Shepp, Gate City, engr.

Tenn., Johnson City—H. Greene, city mgr., repairing 17 mi., resurfacing 7 mi. streets, 6 mi. asphalt on waterbound paving. **WPA. $155,266.**

Tex., Big Spring—Furnishing, laying asphalt for runways base, airport, to Hunter Strain, San Angelo. **$117,545.**

Tex., Houston—Harris Co., H. L. Washburn, aud., paving, grading, drainage structures 18 ft. wide, Airline Rd., to H. E. Cagel, 2131 Kingston St. **$45,565.** H. Zapp, Houston, co. engr.

Tex., Houston—Clinton Park Development Co., c/o C. E. King, pres., 7302 Kernel St., paving, grading, 206 acre plot for dwelling development. Owner builds. Approx. **$80,000.** Est. $100,000.

Tex., Texas City—C. Nessler, mayor, asphalt on asphalt stabilized paving 10 mi. streets, day labor. **$100,000.** Bids 10/8 rejected. J. J. Rady, Majestic Bldg., Ft. Worth, engr. CD 10/6.

†**Va., Virginia Beach** — Con. Q.M., roads and parking areas, Camp Pendleton and Fort Story, to Ames & Webb, Inc., 613 W. Hargett St., Raleigh, N. C. **$165,435.**

N. B., Fredericton—Dpt. P. Wks., 13 mi. Provincial roads, to Dexter Constr. Co., Ltd., Station St., Fairville, St. John, about **$175,000.**

N. S., Kentville—Dpt. Nati. Defense for Air, Ottawa, roads, Aldershot Camp, to Municipal Spraying & Contg. Co., Ltd., 1350 Barrington St., Halifax, **$33,000.**

EARTHWORK, WATERWAYS

PROPOSED WORK

Calif., Turlock — Turlock Irrigation Dist., canal lining in Dists. 283, 290 and 284, incl. miscellaneous irrigation structures. $25,000.

†**Colorado** — Bureau Reclamation, Custom House, surveys rehabilitation Beaver Creek Reservoir, near Alamosa. $33,500.

†**Kan., Atchison**—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., placing accretion paving along 12,950 ft. approved channel Missouri River between Rulo and Quindaro Bends. $73,000.

N. J., Belmar—Jetty, 8 Ave. $40,000. C. W. Birdsall, 1700 Ave. F, engr.

N. J., Deal—Deal Comn., Deal, jetty, stone wall 200 ft. from shore to connect end Neptune Ave. jetty with Allenhurst groin and stone seawall. $106,800.

★†**New York and Ontario**—Federal Power Comn., 18 St. and Pennsylvania Ave. N.W., Wash., D. C., and U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., and General Eng. Dpt. of Transport, Ottawa, Ont., Canada, preliminary plans concrete dam, power plant, approx. 21 mi. canal at Barnhart Island, near Massena, N. Y.; concrete dam, power plant, approx. 7 mi. canal, Crysler Island, near Waddington, N. Y.; job extends from Waddington, N. Y., to point opposite Cornwall, Ont., on American side.

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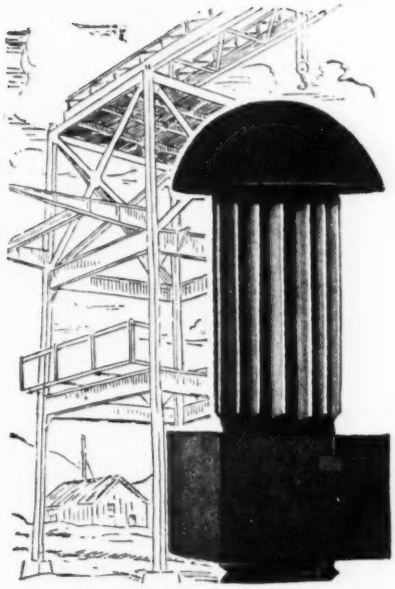

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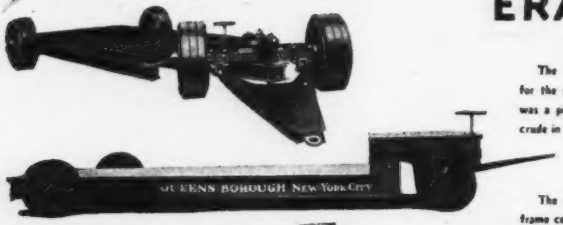
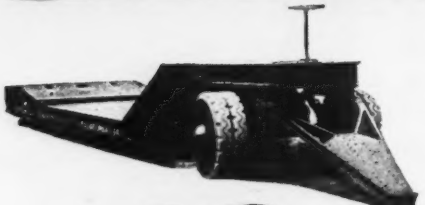


The first Rogers Trailer, developed especially for the quick movement of heavy machinery. It was a pioneering achievement in its day but was crude in relation to later models, as will be noted.



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HAYS MFG. CO., ERIE, PA.

EARTHWORK, etc. (Proposed Work, Contd.)—Lt. Col. A. B. Jones, Massena, N. Y., U. S. engr. J. P. Growden, 251 Orchard Dr., Pittsburgh, Pa., consult. engr. CD 10/23/40—ENR 10/31/40.

★**†Ohio**—Federal Works Agency, 18 and F Sts. N.W., Wash., D. C., flood reservation and dam on Mahoning River near Shiloh, Mill south of Lake Milton. $2,000,000.

Pa., Reading—J. Clinton Bach, city controller, chairman in charge, walling both sides Schuylkill River through city. Over $20,000. R. S. Chubb, city engr.

†Tex., Denison—U. S. Eng., Citizens Bank Bldg., bids soon rein.-con. spillway, Denison Dam Project.

Tex., Ft. Worth—Tarrant Co. Water Dist. 1, Capps Bldg., earthen levee embankment between Greenwood Cemetery and White Settlement Rd. $15,000. Henry Cook, c/o Court House, engr.

Tex., Orange—A. Sokolski, mayor, drainage drainage structures. $75,228. Applied for DPW funds. C. P. Smith, Orange, engr.

†Tex., Port O'Connor—U. S. Eng., Federal Bldg., Galveston, postponed bids to have been opened Oct. 13, three 541 ft. rein.-con., steel retaining walls, 1,700 ft. concrete sheet pile jetty, dolphin, etc. $70,000. CD 10/1.

Wis., LaCrosse—Dredging approx. 130,000 cu. yd. Black River Bathing Beach. J. R. Barth, city engr.

†Alaska, Kodiak—U. S. Eng., Central Bldg., Seattle, Wash., received no bids Oct. 3, dredging waterway in harbor, Inv. 869-42-03, $78,510. CD 9/11—ENR 9/18.

BIDS ASKED

Bids Asked October 28

†Louisiana—U. S. Eng., foot of Prytania St., New Orleans, approx. 1,375,000 cu. yd. earthwork in South Bank Red River Levees, New Orleans Dist.

Bids Asked November 5

†Arkansas—U. S. Eng., Gay Bldg., Little Rock, foundation exploration, Bull Shoals for Dam site, White River, No. 42-27.

†O., Cleveland—U. S. Eng., 960 Ellicott Sq. Bldg., Buffalo, N. Y., removing, disposing 81,000 cu.yd. material other than ledge rock, etc. in Cuyahoga River, Cleveland Harbor, Cir. Pro. 138-42-29.

Bids Asked November 7

†Montana — Bureau Reclamation, Fairfield, earthwork and structures for open drains, Greenfields division, Sun River Project, near Fairfield and Ashuelot, Spec. 1007; adv. ENR 10/23.

Bids Asked November 10

†Utah—Bureau Reclamation, Provo, excavating Ducheane tunnel from Station 5 plus 10 to Station 163 plus 35, Provo River Project, about 24 mi. east of Heber, Spec. 1006; adv. ENR 10/23.

LOW BIDDERS

†California—U. S. Eng., 208 Post Office Bldg., Sacramento, Oct. 9, enlarging, raising, strengthening 31,600 ft. existing levee, constructing appurtenant works, West Levee, W.P.R.R., Intercepting Channel and West Levee of Reed and Hutchinson Creek Lateral from Bear River northerly about 6 mi., Inv. 1105-42-50, from Poulos & McEwen, Box 1017, Sacramento. **$61,437.** Est. $77,260. CD 10/3.

Calif., Los Angeles — Los Angeles County Flood Control Dist., 751 S. Figueroa St., Oct. 14, excav. 1.5 mi. Dominguez Channel, incl. timber bridge, bulkheads, etc., from Morrison-Knudsen Co., 411 W. 5 St. **$55,550.** Est. $50,000. CD 10/1—ENR 9/25.

†Illinois—U. S. Eng., 816 Court & Custom House, St. Louis, Mo., Oct. 14, placing about 1,960,000 cu. yd. earthwork in rebuilding, enlarging 11 mi. levees in Columbia Drainage & Levee Dist., Monroe Co., on Mississippi River, etc., from S. W. Hardwick Co., Beardstown. **$347,658.** Est. $341,326. CD 9/30—ENR 10/2.

†New York—U. S. Eng., Whitehall Bldg., 17 Battery Pl., New York, Oct. 15, dredging 137,950 cu. yd. from Bronx River, from Hazell Properties, Inc., 117 Liberty St., New York, **41.5c.** per cu. yd., total **$57,249.** CD 9/16—ENR 9/18.

N. Y., Marine Park—Comr. Parks, Office Dpt. Parks, Arsenal Bldg., Central Park, 64 St. and 5 Ave., New York, Oct. 14, steel bulkhead beginning Fairlawn Ave., concrete bridge, etc., Contr. R-16-241, Richmond Boro, from C. F. Vachris, Inc., 827 Remsen Ave., Brooklyn. **$297,000** (unofficial). CD 10/7—ENR 10/9.

†Texas — U. S. Eng., Galveston, Oct. 9, dredging approx. 3,000,000 cu. yd. from Sabine Pass jetty channel, from McWilliams Dredging Co., 1021 Hibernia Bldg., New Orleans, La. **$243,900.** CD 9/22—ENR 9/25.

★**†Tex., Denison**—U. S. Eng., Citizens Bank Bldg., Denison, Oct. 14, 2 turbine units for Denison Dam Project, from S. Morgan Smith, 8 E. Smith St., York, Pa., **$1,134,801**; 2 governors for turbine units from Baldwin &

EARTHWORK, etc. (Low Bidders, Cont'd.)

Woodward Governor Co., Rockford, Ill., **$61,935.** CD 9/30—ENR 10/2.

†**Utah**—Bureau Reclamation, Provo, Oct. 13, (1st unit) Provo-Weber diversion canal, Deer Creek Div., Provo River Project, from N. I. Fadel, 7101 Radford Ave., North Hollywood, Calif. **$84,706.** Bids 10/13. CD 9/19—ENR 9/25.

CONTRACTS AWARDED

★†**California**—Bureau Reclamation, Customhouse, Denver, Colo., furnishing 1:6 power transformers, 5 bus structures, 5 transformer-neutral bus structures, for five 75,000 kw. generating units in Shasta Power Plant, Central Valley Project, Spec. 981, six 25,000 kilovolt-ampere, oil-immersed transformers, five 15,000 volt, 3,200 ampere bus structures with potential transformers, current transformers, ground switches and generator lightning arresters and capacitors and 5 transformer neutral bus structures, to Westinghouse Electric & Mfg. Co., Gas & Electric Bldg., Denver, Colo., **$697,865*****four 25,000 kva., oil immersed transformers to Allis-Chalmers Mfg. Co., 1126 S. 70 St., Milwaukee, Wis., **$279,700*****six 25,000 kva. oil immersed transformers, to General Electric Co., 1 River Rd., Schenectady, N. Y., **$421,590.** Grand total $1,309,155. Bids 9/19. CD 9/2—ENR 9/4.

★†**California**—Bureau Reclamation, Customhouse, Denver, Colo., furnishing three 25,000 kva. generators for Keswick power plant, Kennett Div. Central Valley Project, Spec. 992, to General Electric Co., 1 River Rd., Schenectady, N. Y. **$975,800.** Bids Sept. 29. CD 9/3—ENR 9/11.

★†**California**—U. S. Eng., 208 Postoffice Bldg., Sacramento, enlarging, etc. levees from West Levee, Feather River to Sutter Buttes, Wadsworth Canal, to H. Earl Parker, 1112 G St., Maryaville. **$655,654.** Bids 9/25, awarded 10/9. CD 9/30—ENR 10/2.

Mass., Boston—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., 2 stone jetties, Brant Rock, Marshfield, to G. M. Bryne, 294 Washington St. **$34,170.**

†**Mo., Lake City**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., drainage and flood control construction, vicinity Lake City Small Arms Plant, near here. **WPA. $149,053.**

†**Mo., Lexington**—U. S. Eng., 601 Davidson Bldg., Kansas City, 7,400 ft. revetment in Missouri River between Sni Bend and Lexington Reach, center of work 3½ mi. from here, hired labor and government plant. **$100,000.** CD 10/9—ENR 10/16.

†**Neb., Peru**—U. S. Eng., 1709 Jackson St., Omaha, 769 ft. standard revetment in Missouri River, Kansas Bend, hired labor and government plant. **$20,000.** CD 10/8—ENR 10/16.

N. J., Bloomfield—Essex Co. Park Comn., 115 Clifton Ave., Newark, flood control 2nd River, Watsessing Park, deepening, widening, paving river bottom, retaining walls, **WPA. $47,500.** R. D. Crater, 115 Clifton Ave., Newark, WPA and owner's engr. CD 10/2—ENR 10/9.

N. J., Bridgeton—Rein.-con. spillway addn. City Park, **WPA. $37,144.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA eng. CD 228—ENR 3/6.

N. J., Cape May—Replacing, exten. existing timber groynes along beach front, between Decatur St. and Patterson Ave. **WPA. $30,420.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr. CD 2/19—ENR 2/27.

†**N. Y., Buffalo**—U. S. Eng., 540 Federal Bldg., dredging 541,000 cu.yd. Buffalo Harbor, to Great Lakes Dredge & Dock Co., Morgan Bldg. **$144,718.** Awarded 10/10. CD 9/18—ENR 9/25.

★†**O., Cincinnati**—U. S. Eng., Federal Bldg., Mill Creek pump station, to Fred J. Robers Constr. Co., Burlington, Wis., and La Crosse Dredging Corp., 411 Plymouth Bldg., Minneapolis, Minn., **$2,439,642.** Bids 9/30, awarded 10/6. CD 10/16.

Pa., Pittsburgh—Comrs. Allegheny Co., R. G. Woodside, controller, Riverfront Blvd. imprv., Duquesne Way, Contr. 13, superstructure underpass under westbound roadway, altering south approaches to 6, 7 and 9 St. bridges, to C. Jacobson, 1840 Cecil St., Sharpsburg, **$65,270;** Contr., 15, handrailing, to Fort Pitt Malleable Iron Co., McKees Rocks, **$41,778.** Bids 107. CD 9/17—ENR 9/25.

Tex., Edinburg—Water Control & Imprvt. Dist. 9, Edinburg, clearing, grubbing, canals, canal lining, bridges, drain crossings, etc. **WPA. $117,278.** Fitzgerald & Tamm, Harlingen, engrs.

UNCLASSIFIED

PROPOSED WORK

★**Arkansas**—RURAL ELECTRIC LINES—Kamo Electric Co-operative, Inc., E. H. Looney, chn., Vinita, Okla., transmission lines. $1,542,000 REA allot.

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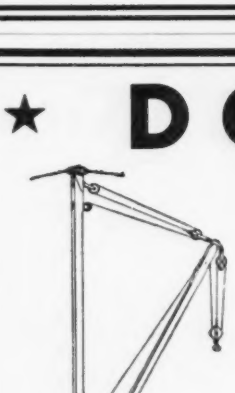

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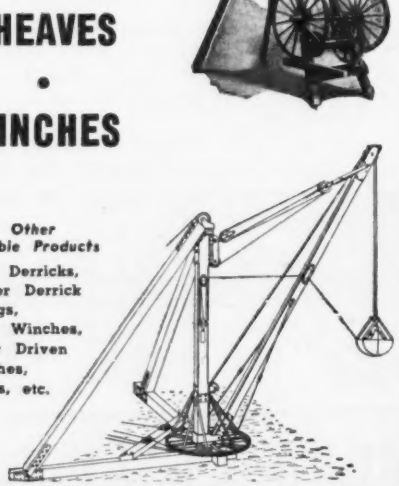

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NIAGARA FALLS, N. Y.

UNCLASSIFIED (Proposed Work cont'd.)

★**California**—TRANSMISSION LINE—Pacific Gas & Electric Co., 245 Market St., San Francisco, 70 mi. 70 kv. steel tower transmission line from the valley to San Luis Obispo sub-station. $727,615.

Calif., Hueneme—FLOATING BOAT SLIPS, etc.—Oxnard Harbor Dist., Port Hueneme, floating boat slips with appurtenances, installing marine railway on west side of entrance channel, Port Hueneme.

Calif., Wilmington—WHARF—Larson Boat Shop, Wilmington, 70 ft. wharf, Fish Harbor, Los Angeles Outer Harbor.

★**Fla., Jacksonville**—AIRPORT—Airport on 740 acre tract, St. Johns Bluff, near here. $545,000. CAA.

Georgia—RURAL ELECTRIC LINES—Flint Electric Membership Corp., L. [illegible] Woolard, supt., Reynolds, 93 mi. rural electric lines, Crawford, Macon, Taylor, Peach, Marion, Houston and Schley Counties. $79,000 REA allot.

Georgia—RURAL ELECTRIC LINES—Hart County Electric Membership Corp., G. Bell, supt., Hartwell, 159 mi. rural electric lines, Franklin, Madison, Hart, Elbert and Stephens Counties. $156,000 REA allot.

Idaho, Lewiston—AIRPORT—Airport, $300,000. WPA funds sought.

Illinois—RURAL ELECTRIC LINES—Coles-Moultrie Electric Co-operative, J. G. Wagoner, supt., Mattoon, 247 mi. rural electric lines, Coles, Macon, Cumberland, Douglas, Moultrie and Piatt Counties. $252,000 REA allot.

Illinois—RURAL ELECTRIC LINES—Jo-Carroll Electric Co-operative, Inc., F. J. Ruble, supt., Elizabeth, 134 mi. rural electric lines, Jo Daviess and Carroll Counties. $110,000 REA allot.

Illinois—RURAL ELECTRIC LINES—Monroe County Electric Co-operative, Inc., C. M. Douglas, supt., Waterloo, 88 mi. rural electric lines, St. Clair, Monroe and Randolph Counties. $83,000 REA allot.

Ill., Rock Island—SWIMMING POOL—Bids soon swimming pool, R. P. Galbraith, mayor, $145,000. CD 3/12—ENR 3/20.

Kentucky—RURAL ELECTRIC LINES—South Kentucky Rural Electric Co-operative Corp., R. D. Gregory, supt., Somerset, 197 mi. rural electric lines, Pulaski, Wayne, Clinton, Russell, McCreary, Laurel, Adair, Casey and Lincoln Counties. $166,000 REA allot.

Minnesota — RURAL ELECTRIC LINES—Goodhue County Co-operative Electric Assn., G. W. Bleecker, supt., Zumbrota, 65 mi. rural lines, Goodhue, Olmstead, Rice and Wabash Counties. $78,000 REA allot. Pillsbury Eng. Co., 1200 2 Ave. S., Minneapolis, engrs.

Minnesota—RURAL ELECTRIC LINES—Kandiyohi Co-operative Electric Power Assn., J. M. Nelson, supt., Willmar, 168 mi. rural electric lines, Swift, Chippewa and Kandiyohi Counties. $110,000 REA allot. United Eng. Serv., 1406 W. Lake St., Minneapolis, engrs.

Minnesota—RURAL ELECTRIC LINES—Nobles Co-operative Electric, W. N. McCarville, supt., Worthington, 277 mi. lines, Nobles, Jackson and Murray Counties. $230,000 REA allot. Banister Eng. Co., 1586 University Ave., St. Paul, engrs.

Minnesota — RURAL ELECTRIC LINES—Renville-Sibley Co-operative Power Assn., E. Schmechel, acting supt., Fairfax, 136 mi. rural electric lines, Renville and Sibley Counties. $115,000 REA allot.

†**Mo., Vichy**—AIRPORT—U. S. Eng., 816 U. S. Court House and Custom House, St. Louis, bids soon, army airport, runways, aprons, hangars, shops, barracks, water and sewer facilities, lighting sys., CD 8/22—ENR 8/28.

Montana—RURAL ELECTRIC LINES—Park Electric Co-operative, Inc., E. C. Kaiserman, mgr., Livingston, 107 mi. rural electric lines, Park, Sweet Grass and Gallatin Counties. $114,000 REA allot.

Montana—RURAL ELECTRIC LINES—Vigilante Electric Co-operative, Inc., H. Babcock, supt., Twin Bridges, 246 mi. rural electric lines, Beaverhead, Deer Lodge, Silver Bow, Broadwater, Madison and Jefferson Counties. $220,000 REA allot. J. M. Garrison, Helena, engr.

Mont., Helena—LANDING STRIP—U. S. Eng., Fort Peck, bids in October or November paved landing strip, 150 ft. wide and graded to 500 ft. airport. $144,000. CAA. CD 9/26—ENR 10/2.

Mont., Helena—RUNWAY PAVING—U. S. Eng., Fort Peck, bids early spring, runway paving, municipal airport, $114,800.

★**Nebraska** and **Colorado**—RURAL ELECTRIC LINES—Rural Electric Co., G. N. Phillips, supt., Pine Bluffs, Wyo., 703.8 mi. rural electric lines, Kimball, Banner, Morrill, Garden, Deuel and Cheyenne Counties, Neb. and Logan Co., Colo. $578,000 REA allot.

New Hampshire—RURAL ELECTRIC LINES—New Hampshire Electric Co-operative, Inc., 14 Main St., Plymouth, 181 mi. rural electric lines, Coos, Grafton, Sullivan, Merrimack, Cheshire, Carroll, Belknap, Strafford and Rockingham Counties. $190,000 REA allot.

N. J., Egg Harbor & Galloway—LIGHTING SYSTEM—City of Atlantic City, City Hall, Atlantic City, lighting system, etc., for new airport, English Creek and Tilton Rds. $55,000.

UNCLASSIFIED (Proposed Work, Cont'd.)

WPA. G. R. Swinton, 930 Atlantic Ave., Atlantic City, owner's and WPA engr.

†**N. J., Fort Dix**—RAILROAD—Con. Q.M., 5 mi. standard gage railroad, etc., $60,326 WPA. W. D. Cougle, 1102 S. Broad St., Trenton, owner's and WPA engr.

†**N. J., Fort Monmouth**—RAILROAD—Con. Q.M., 7 mi. main line railroad and 2 mi. railroad sidings, $50,374. WPA.

N. J., New Brunswick — GROUND IMPROVEMENTS — Rutgers University, College Ave., ground improvs., excavating, grading, etc., golf course, G and H Fields and Nelson Field. $55,040. WPA. J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, owner's and WPA engr.

N. J., Piscataway and **Highland Park**—PARK IMPROVEMENTS — Middlesex Co., Court House, New Brunswick, exten. picnic grounds, earth bulkhead, paths, lake outlet, water line, parking area, curbs, landscaping, etc. $97,717. WPA. J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, owner's and WPA engr.

N. J., Sayreville—DOCK—National Lead Co., Chevalier Ave., South Amboy, dock, unloading equip., Raritan River, $290,000 incl. equip.

★**New York**—RURAL ELECTRIC LINES—Steuben Electric Assn. Inc., J. B. Hubbard, supt., Bath, bids soon 700 mi. rural electric lines, Steuben Co. $664,000 REA allot.; also 1,200 mi. rural electric light and power lines, $500,000. Applying for REA allot. Gibbs & Hill, Inc., 600 N. 2 St., Harrisburg, Pa., engrs. CD 10/6—ENR 10/9.

N. Y., Brooklyn—BULKHEAD PLATFORM, etc.—Dpt. Docks, Pier A, North River, New York, bulkhead platform, derrick equip. for Naval Reserve Slip, foot of E. 52 St. $90,000.

N. Y., Brooklyn—BATH HOUSE—President Brooklyn Boro, Boro Hall, reconstructing bathhouse, Hicks St. $150,000.

N. Y., Flushing—DOCK—President Queens Boro 120-55 Queens Blvd., Kew Gardens, exten. dock, Flushing River Asphalt Plant 1. $160,000.

★**N. Y., New York**—PIER, etc.—Dpt. Docks, Pier A, North River, pier, shed and equip., Pier 79, North River. $2,444,000.

N. Y., New York—PIER, etc.—Dpt. Docks, Pier A, North River, reconstructing pier and shed, Pier 30, East River. $91,000.

N. Y., New York—PLATFORM—Dpt. Sanitation, 125 Worth St., enclosed waterfront unloading platform, W. 135 St. $450,000.

N. Y., New York—TUNNEL TILE, etc.—New York Tunnel Auth., 200 Madison Ave., tunnel side wall tile, tunnel roadway paving in connection with Brooklyn-Battery Park tunnel.

North Carolina—RURAL ELECTRIC LINES—French Broad Electric Membership Corp., M. W. Bennett, supt., Marshall, 224 mi. rural electric lines, Madison, Yancey and Buncombe Counties. $235,000 REA allot.

Ohio—RURAL ELECTRIC LINES—Lorain-Medina Rural Electric Co-operative, Inc., H. Bovard, supt., 8 mi. rural electric lines. $27,500 REA allot.

O., Cincinnati—AIRPORT—Bd. Comrs. Hamilton Co., $650,000 bond election Nov. 4, airport. H. Coates, co. engr.

★**O., Cincinnati**—PLAYGROUNDS—$2,000,000 bond election Nov. 4, constructing imprv. playgrounds. H. H. Kranz, city engr.

★**O., Columbus**—CABLE—Ohio Bell Telephone Co., 750 Huron Rd., Cleveland, R. Elde, pres., long distance cable network between Massillon, Findlay, Delaware and Mansfield, O. $1,583,000.

★**O., Dayton**—AIRPORT IMPROVEMENTS—Plans by W. G. Ward, 2 story, steel administration bldg., municipal airport, $162,000; runways, approaches, $380,000. J. F. Hale, city engr.

Oklahoma — RURAL ELECTRIC LINES — Cotton Electric Co-operative, C. W. Cox, supt., Walters, 260 mi. rural electric lines, Cotton, Tillman, Jefferson and Stephens Counties. $120,000 REA allot., CD 10/14—ENR 10/16; 127 mi. rural electric lines, Cotton, Comanche and Caddo Counties, $180,000 REA allot., CD 10/17. C. H. Guernsey, Cherokee, engr.

†**Okla., Fort Sill**—RUNWAYS, etc.—U. S. Eng., Citizens Bank Bldg., Denison, runways, lighting sys., imprvs., Post Field. $200,000.

Oregon—RURAL ELECTRIC LINES—Benton-Lincoln Electric Co-operative, Inc., G. Thomas, supt., Corvallis, 413 mi. rural electric lines, Benton, Lane, Linn and Polk Counties. $465,000 REA allot.

†**Ore., Portland**—POWER LINE—Bonneville Power Project, P. O. Box 3537, rejected bids

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UNCLASSIFIED (Proposed Work, Cont'd.)

Aug. 13, Willamette River Crossing, Bonneville transmission sys., Inv. 2116. Will readvertise. CD 8/20—ENR 8/28.

Pa., Reading—FLOODLIGHTING SYSTEM—J. C. Bach, city councilman in charge, bids soon complete floodlighting sys., municipal airport, $25,000-$30,000. R. S. Crabb, city engr.

★**†R. I., Quonset Point**—NAVAL AIR STATION—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., additional expansion Naval Air Station, seaplant hangar $650,000, barracks, mess halls, quarters for 2,000 men $1,600,000, gasoline distr. sys. $250,000, lubrication oil storage $40,000, recreation facilities $100,000, photographic laboratory $50,000, purchase and imprv. of land $600,000. Total est. $5,637,000. Additional to CD 7/15—ENR 7/18, under CA.

★**S. C., Charleston**—PIERS—Charleston Shipbuilding & Drydock Co., 108 Concord St., two 480 ft. solid filled piers, 1 fifty and 1 forty ft. wide, 120 ft. apart, slip between to be dredged 41 ft. below mean low water to accommodate 6,000 ton floating drydock, $2,000,000. Dotterer Eng. Co., 21 Broad St., engr.

S. D., Spearfish—AIRPORT—Lawrence Co., Deadwood, imprv. Black Hill Airport, new runways, changing 1 runway, hard-surfacing runways, draining, lighting, near here. $50,000. Applied to WPA.

†Tenn., Nashville—AIR FIELD—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., municipal field, 2 barracks, day room, supply room, 2 mess halls, guard house, 3 officers' quarters, warehouse, garage, officers' rest room, completion hangar, fueling sys. and airplane parking area, for Ferrying Command.

Tenn., Nashville—TAXIWAYS, HANGAR APRONS, etc.—T. L. Cummins, mayor, taxiways, concrete hangar aprons, barracks, Benny Field. $483,000.

Texas—RURAL ELECTRIC LINES—Coleman County Electric Co-operative, Inc., S. R. Hale, supt., Coleman, 100 mi. rural electric lines, Callahan, Coleman, Concho, Runnels and Taylor Counties. $70,000 REA allot. J. E. Ward, Harvey-Snider Bldg., Wichita Falls, engr.

Texas—RURAL ELECTRIC LINES—Lamb County Electric Co-operative, Inc., O. K. Woodall, supt., Littlefield, 201 mi. rural electric lines, Hockley, Lamb and Hale Counties. $103,000 REA allot.

Texas—RURAL ELECTRIC LINES—Lone Wolf Electric Co-operative, Inc., O. I. Griffin, supt., Colorado City, 131 mi. rural electric lines, Mitchell, Nolan, Howard, Borden and Scurry Counties. $94,000 REA allot. Midwestern Eng. & Constr. Co., McBirney Bldg., Tulsa, Okla., engrs.

★**†Tex., Denison**—GENERATING UNITS—U. S. Eng., Citizens Bank Bldg., bids soon, 2 generating units for Denison Dam Project. $700,000.

†Tex., San Antonio—TARGET RANGE—U. S. Eng., Federal Bldg., Galveston, Puff Target Range, Brooks Field. $75,000.

Wash., Bremerton—RECREATION CENTER IMPROVEMENTS—City, L. Walters, city recreation supt., grading, leveling, installing play equip., lighting, etc., city playfields. $211,000. Federal funds sought.

Wash., Gig Harbor—SHIPWAYS—Harbor Shipbuilding Corp., Exchange Bldg., Seattle, addnl. ways, Skansie Shipyards. Over $40,000.

†Wash., Walla Walla—LANDSCAPING, etc.—U. S. Veterans Admin., Vermont Ave. between H and I Sts., Wash., D. C., landscaping, curbing, guttering, etc., Veterans Hospital. $23,946. WPA funds sought.

Wash., Yakima—RUNWAYS, etc.—300 ft. exten. Runway 3, 2 taxi strips, 350,000 sq. yd. double seal coat asphalt for runways. $153,641. WPA funds sought.

Wash., Yakima — RUNWAYS, etc. — 300 ft. 9, dock. $250,000. J. H. Barth, city engr. W. S. Woods, 304 Main St., consult. engr. CD 9/4—ENR 3/20.

★**Man., Souris**—AIR TRAINING SCHOOL—Secretary Dpt. Munitions & Supply, Ottawa, Ont., bids soon British Commonwealth Air Training School, 6 double hangars, living quarters, mess halls, etc. $1,200,000, runways and taxi strips $475,000, for Dpt. National Defense for Air, Ottawa, Ont.

†Nova Scotia—AIRBASE—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., bids in November, airbase.

Ontario—POWER LINE—Winnipeg Electric Co., 21 Notre Dame St., Winnipeg, Man., 200 mi. hydro-electric power line from Atikokan to Kenora.

★**Ont., Ottawa**—TRANSMISSION LINES—Hydro-Electric Power Comn. of Ontario, 620 University Ave., Toronto, bids soon 5th transmission line between Toronto and Ottawa River from Toronto to Rideau Lake Dist. thence to Massou, Que., on Ottawa River. $3,500,000.

★**Que., Masson** — DAMS — Macharen Power Co., Ltd., Buckingham, bids early 1942, series dams. $2,000,000.

Que., Mont Joli—RAILROAD YARD GRADING—Canadian National Rys., H. A. Dixon, ch. engr. (oper.), 360 McGill St., Montreal, grading yards. $30,000.

UNCLASSIFIED, Cont'd.

BIDS ASKED

Bids Asked After October 13

†**La., Lake Charles**—FLYING FIELD IMPROVEMENTS—U. S. Eng., foot Prytania St., New Orleans, grading, draining, concrete paving 500,000 sq. yd. flying field, Advanced Single Engine School.

Bids Asked October 31

†**Tex., San Antonio**—UNDERGROUND UTILITIES— U. S. Eng., Federal Bldg., Galveston, underground utilities (gas, water and sewer), to proposed Hospitalization and Medical Service Bldgs., Kelly Field.

†**Va., Langley Field**—STEAM DISTRIBUTING SYSTEM—U. S. Eng., Norfolk, high pressure steam distr. sys., hot water heating sys., boiler room addns., alterations, Spec. 625; adv. ENR 10/23.

Bids Asked November 3

†**Arizona-California-Nevada**—STEEL PIPE, etc.—Bureau Reclamation, Customhouse, Denver, Colo., furnishing, del. fabricated steel pipe, fittings, valves for Unit A-5, Boulder Power plant, Boulder Canyon Project, Spec. 1579-D.

Tex., Houston — AIRPORT — U. S. Eng., Federal Bldg., Galveston, airport imprvs., paving, 2 runways, taxiway, municipal airport. CD 10/9—ENR 10/16.

Bids Asked November 4

†**Miss., Starkville** — AIRPORT RUNWAYS, etc.—U. S. Eng., Mobile, Ala., paving runways, taxiways, clearing, grubbing, etc., municipal airport, Hy. 12, near here. CAA.

Miss., Waveland—GAS SYSTEM—Natural gas transmission and distr. sys. $50,000. T. P. Joseph, Glenmore, La., engr. CD 8/25—ENR 8/28.

Bids Asked November 5

Nebraska—TRANSMISSION LINES — Central Nebraska Public Power & Irrigation Dist., G. Wallace, pres., 1507-1509 W. 2 St., Hastings, transmission lines, Groups 105 A, B and C, 106 A, B, 107 A, B, C and D; adv. ENR 10/23. CD 8/11—ENR 8/14.

Tex., Gilmer—FIELD BUILDINGS, etc.—Farmers Electric Generating Co-operative, c/o H P. McGaughy, Gilmer, 8 field bldgs., 9 transformers. $200,000. Tentative date. Freese & Nichols, Capps Bldg., Fort Worth, engrs.

Bids Asked About November 6

†**N. M., Clovis**—AIR NAVIGATION FACILITIES—U. S. Eng., Caddoa Dist., Caddoa, Colo., air navigation facilities.

Bids Asked November 6

†**Washington** — TELEPHONE TERMINAL EQUIPMENT—Bureau Reclamation, Customhouse, Denver, furnishing, del. carrier-current telephone terminal equip. for Grand Coulee power plant, Columbia Basin Project, Spec. 1582-D.

†**Washington** — VENTILATING SYSTEM SHEET METAL WORK—Bureau Reclamation, Coulee Dam, sheet metal work for ventilating sys. for Grand Coulee Power Plant, Columbia Basin Project, Spec. 1580-D.

Bids Asked November 7

†**Ore., Portland**—SWITCHBOARD—U. S. Eng., 628 Pittock Blk., furnishing 480 volt power switchboard for Bonneville powerhouse, Inv. 698-42-232.

Bids Asked November 12

†**California** — TRANSFORMERS — Bureau Reclamation, Customhouse, Denver, Colo., furnishing, del. transformers for Keswick power plant, Central Valley Project, Spec. 1008; adv. ENR 10/23.

Bids Asked About November 15

Kansas — RURAL ELECTRIC LINES — Nemaha-Marshall Electric Co-operative Assn., Axtell, 229 mi. transmission lines. Paulette & Wilson, 1006 Kansas St., Topeka, engrs. CD 8/21—ENR 8/28.

Bids Asked After December 8

N. Y., New York—VENTILATION SHAFT, etc.—New York Tunnel Auth., 200 Madison Ave., ventilation shaft and tunnel, sections 600 and 1,000 ft. north and south from Governor's Island.

LOW BIDDERS

★†**Calif., Santa Ana**—AIR CORPS TRAINING CENTER—U. S. Eng., 751 S. Figueroa St., Los Angeles, Oct. 10, Army Air Corps Training Center, near here, from R. D. Merrill Constr. Co., Helena, Mont., also c/o Las Vegas, Nev. Military Airport, Las Vegas, Nev. **$1,787,775.** CD 9/23—ENR 9/25, under Public Bldgs.

†**Okla., Tulsa**—RUNWAYS, etc.—U. S. Eng., Wright Bldg., Tulsa, Okla., runways, taxi strips, control tower, bomber assembly plant, North Lewis St., near here, from Chas. J. Dorfman, 124 N. La Brea Ave., Los Angeles, Calif. **$389,777.** Est. $450,000. CD 9/29—ENR 10/2.

†**Oregon** — TOWERS — Bonneville Power Admin., 811 N.E. Oregon St., Oct. 6, furnishing steel towers for Bonneville-Vancouver Line No. 5, Inv. 2237, from American Bridge Co., Frick Bldg., Pittsburgh, Pa. **$293,249.** CD 9/16—ENR 9/18.

UNDERPINNING & FOUNDATION CO., Inc

Engineers & Contractors

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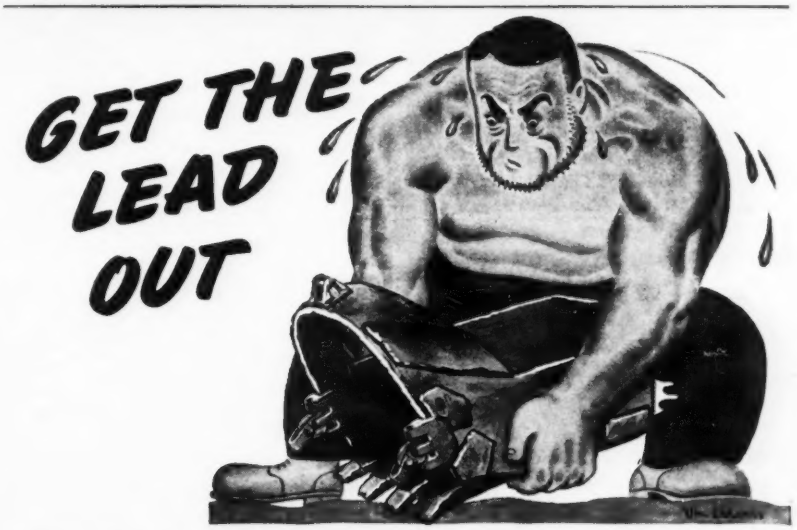

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UNCLASSIFIED (Low Bidders, Cont'd.)

†**Oregon**—TRASH RACKS, etc.—U. S. Eng., 628 Pittock Blk., Oct. 10, furnishing, del. steel trash racks, gates, stop logs, dogging devices and storage hooks for Bonneville power house, Inv. 698-42-150, from Bethlehem Steel Co., E. 3 St., Bethlehem, Pa. **$97,183.** CD 9/16—ENR 9/18.

†**Ore., Bonneville**—DISCONNECTING SWITCHES—U. S. Eng., Pittock Blk., Portland, Oct. 9, furnishing 27 disconnecting switches for Bonneville Dam power house, Inv. 698-42-149, from Pacific Electric Mfg. Corp., 5815 3 St., San Francisco, Calif. **$33,641.** CD 9/15—ENR 9/18.

†**Ore., Bonneville**—TRANSFORMERS—U. S. Eng., Pittock Blk., Portland, Oct. 14, furnishing seven 60,000 kva. single phase transformers for Bonneville Dam power house, Inv. 698-42-201, from General Electric Co., 1 River Rd., Schenectady, N. Y. **$496,839.**

Pa., Montoursville—AIRPORT IMPROVEMENTS—City of Williamsport, City Hall, Williamsport, grading, paving 4,300 ft. runway, municipal airport, from Union Paving Co., Broad and Stiles Sts., Phila., Pa. **$138,000.** CAA. CD 2/4—ENR 2/6.

†**Washington**—BULKHEAD GATES—Bureau Reclamation, Custom House, Denver, Colo., Oct. 9, furnishing twenty-seven bulkhead gates for installation outlet ends turbine draft tubes in right power house, Grand Coulee Dam, Columbia Basin Project, Spec. 989, from Mississippi Valley Structural Steel Co., 3117 Big Bend Rd., St. Louis, Mo. **$42,853.** CD 9/16—ENR 9/18.

CONTRACTS AWARDED

Ark., Fayetteville — LANDSCAPING, etc.—University of Arkansas, landscaping, sidewalks, drainage, etc. **WPA. $160,000.** C. Clayton, Fayetteville, archt.

Calif., Sacramento—UNDERGROUND CONDUITS—Pacific Telephone & Telegraph Co., Telephone Bldg., San Francisco, underground conduits, Sacramento and N. Sacramento areas, to Lowrie Paving Co., Inc., 1540 16 St., San Francisco. **$43,210.**

†**Calif., Taft**—LANDING AREA—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., temporary landing area, to W. W. Petley, 1426 S. La Brea Ave., Los Angeles. **$44,586.**

†**Del., New Castle**—RUNWAYS—U. S. Eng., 900 Customhouse, 2 and Chestnut St., Phila., Pa., draining, paving 3 runways, to Standard Bitulithic Co., 50 Church St., New York, N. Y. **$481,723.** Awarded 10/8. CD 8/22—ENR 8/28.

†**Ga., Fort Benning**—DEVELOPING PARACHUTE TRAINING AREA—Con. Q.M., developing parachute training area, to R. H. Wright & Son, Columbus. **$57,119.** Bids 9/30, awarded 10/4, under Public Bldgs.

Illinois—RURAL ELECTRIC LINES—Central Illinois Electric & Gas Co., 40 mi. rural electric transmission lines, New Milford and Cherry Valley Dists., own forces. **$25,000.**

Illinois and **Indiana** — GAS PIPELINE — R. Phebus, Centralia, 8 mi. natural gas pipeline between Russellville, Ill. and Vincennes, Ind., own forces.

Ia., Sac City — SWIMMING POOL, etc. — Rein.-con. swimming pool, bath house, etc., to C. I. Small & Son, Sioux City. Est. **$25,000.** CD 7/30—ENR 8/7.

†**La., De Ridder**—GASOLINE STORAGE, etc.—U. S. Eng., foot of Prytania St., New Orleans, Air Corps gasoline storage and dispensing sys., De Ridder Airport, to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. **$41,305.** Bids 10/1, awarded 10/14. CD 9/23—ENR 9/25.

†**La., Lake Charles**—HANGARS—U. S. Eng., foot of Prytania St., New Orleans, 3 hangars, Advanced Single Engine School, to Star Mfg. Co., 3012 South Stiles St., Oklahoma City, Okla. **$135,000.** Bids 10/10. CD 10/6.

†**Md., Forest Glen**—SITE DEVELOPMENT—Pub. Bldgs. Admin., FWA, 7 and D Sts. S.W., Wash., D. C., site development, utilities, etc., Army Medical Center, to Wilmoth Paving Co., 1 and P Sts. S.E., Wash., D. C. **$57,833.**

Michigan — DRILLING WELLS — Pure Oil Co., W. Wacker Dr., Chicago, Ill., extensive development crude oil properties, drilling 4 or more deep wells, connecting and gathering lines, steel tank storage facilities, pump. plants, etc., in Osceola and Lake Counties; drilling wells, to Lupher Drilling Co., Mt. Pleasant; separate contracts for other phases of work. Est. over **$50,000.**

†**Miss., Biloxi** — NATURAL GAS TRANSMISSION LINE—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., natural gas transmission line, Keesler Field, to Brown & Root, Inc., New Orleans, La., and 412 Fannin St., Austin, Tex. **$52,937.**

†**Miss., Biloxi**—WARM UP APRON—U. S. Eng., Federal Bldg., Mobile, Ala., warm up apron 93,000 sq. yd. concrete paving, electric service pits, underground ducts, etc., to Barber Bros. Contg. Co., Reymond Bldg., Baton Rouge, La. **$280,888.** Est. $300,000. Awarded 10/1.

†**Nev., Hawthorne**—AMMUNITION DEPOT FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., sewer, water, gas sys., railroad, etc., Naval Ammunition Depot, to Radich & [illegible], 3000 Empire Ave., Burbank, Calif. $4[illegible],000, plus fixed fee basis. CD 4/4—ENR [illegible]/10, under Public Bldgs.

★**New Jersey**—VENTILATION BUILDING—At office General Manager Port of New York Auth., 111 8 Ave., New York, N. Y., Contr. MHT-58, New Jersey ventilation bldg., Lincoln Tunnel, to Jas. J. Waters Corp., 415 Lexington Ave., New York, N. Y. **$519,444.** Bids 10/7. CD 10/8—ENR 10/16, under LB.

†**N. J., Fort Monmouth**—LANDSCAPING, etc.—Con. Q.M., landscaping, excavating, grading. **WPA. $55,000.** W. S. Cougle, 1102 S. Broad St., Trenton, owners' and WPA engr. CD 9/29—ENR 10/2.

N. J., Jersey City—COAL and ASH HANDLING FACILITIES—Pennsylvania R.R. Co., W. D. Wiggins, ch. engr., Broad St. Station Bldg., Phila., Pa., 2 locomotive coal and ash handling facilities, track laying, concrete fdns. for machinery, etc., to Ogle Constr. Co., 28 E. Jackson Blvd., Chicago, Ill. **$105,000.**

†**Okla., Enid**—GASOLINE FUELING SYSTEM, etc.—U. S. Eng., Tulsa, Air Corps gasoline fueling sys. and oil storage, Basic Flying School, to Flotation Systems, Inc., 4021 Goodwin Ave., Los Angeles, Calif. **$130,313.** CD 9/3.

Okla., Vinita—SUBSTATION—Grand River Dam Auth., Tulsa, power transformer substation, switching sta., to Elliott Constr. Co., Omaha, Neb. **$211,474.** Est. $225,000. Awarded 10/3. W. R. Holway, Vinita, Okla., engr. CD 5/13—ENR 5/15.

Pennsylvania—RAILROAD SPUR LINE—Baltimore & Ohio R.R. System, C. W. Van Horn, vice pres. (oper. & maint.), Baltimore and Charles St., Baltimore, Md., 8.3 mi. railroad spur line near Coleman Station to Shanksville, in Stonycreek Twp., to George Vang, Inc., Grant Bldg., Pittsburgh, Pa. CD 9/23—ENR 9/25, under CA.

Tex., Beaumont—AIRPORT—Jefferson Co., airport, grading, draining, runways, lighting, etc., midway between Port Arthur and Beaumont, **WPA. $333,196.** Heartfield & Woodside, 10111 Amer. Natl. Bank Bldg., engrs. CD 5/22—ENR 5/29.

Tex., Beaumont—STEAM PIPE LINES—Lamar College, c/o Judge J. M. Coombs, Beaumont, steam pipe lines, etc., to H. B. Neild, Goodhue Bldg. **$28,592.** Est. $30,000. Stone & Pitts, Goodhue Bldg., archts.

†**Tex., Camp Bowie**—GROUND IMPROVEMENTS, etc.—Con. Q.M., ground imprvs., roads, band stand, tennis courts, dance pavilions, etc., **WPA. $162,000.** CD 10/8—ENR 10/16.

†**Tex., Camp Wallace**—GROUND IMPROVEMENTS—Con. Q.M., Camp Wallace, additional ground imprvs., grading, draining, sodding, landscaping, athletic courts, etc. **WPA. $205,688.**

Tex., Corsicana—AIR TRAINING FIELD—Air Activities of Texas, Corsicana, training field, 2 hangars, water and sewer lines, barracks, etc., force account. Approx **$85,000.** Est. $90,000.

Tex., Jolly — PIPELINE — Continental Pipe Line Co., c/o Eagle Ford Rd., and Fair Bldg., Fort Worth, Dallas, 22 mi. 4 in. steel pipe line, Ross Pool area, force account. Approx. **$70,000.**

†**Tex., San Antonio**—MILITARY AREA IMPROVEMENTS—U. S. Eng., Federal Bldg., Galveston, additional general imprvs., water, sewer, gas, roads, concrete tent bases, railway spurs, grading, etc. Military area, Kelly Field. **WPA. $103,863.**

★†**Washington** — TRANSMISSION LINE CONDUCTOR, etc. — Bonneville Power Admin., P. O. Box 3537, Portland, Ore., conductor and accessories for Bonneville Coulee Line 2, Inv. 2125, to Phelps Dodge Copper Products Co., 40 Wall St., New York, N. Y. **$885,295.** Bids 8/18, awarded 10/17. CD 8/21—ENR 8/28.

†**Wash., Spokane**—AIRPORT—U. S. Eng., Central Bldg., Seattle, addnl. bldg. construction, Geiger Field, to Clifton & Applegate & Henry Georg, Hutton Bldg. **$120,489.**

Alta., Edmonton—MAINS—North Western Utilities, Co. Ltd., Edmonton, mains to property line services, day labor. **$30,000.**

Alta., Ensign—AERODROME—Dpt. Transport, Ottawa, Ont., aerodrome development, Relief 2, to Kirkcaldy, incl. grading, smoothing, etc., to W. H. Reed, Edmonton, about **$60,000.**

B. C., Prince Rupert—DEFENSE DEPOT—Dpt. P. Wks., Ottawa, Ont., boom defense depot to E. J. Ryan Contg. Co., Ltd., 445 Granville St., Vancouver. **$47,600.** K. M. Cameron, c/o owner, engr.

Man., Douglas—AERODROME—Dpt. Transport, Ottawa, Ont., groundwork development, clearing hard-surface runway and taxi strip, etc., Intermediate (Relief) Aerodrome, to Long Lac Constr. Co. Ltd., Royal Edward Hotel, Fort William, Ont., about **$200,000.** CD 10/14—ENR 10/16.

Man., Portage la Prairie—AERODROME—Dpt. Transport, Ottawa, Ont., aerodrome development, grading, drainage, hard-surface runway and taxi strip, etc., to Rayner Constr.

UNCLASSIFIED (Contracts Awarded, Cont'd.)

Co. Ltd., 29 Commercial St., Toronto, Ont. About **$235,000.**

N. B., Saint John—AIRPORT—Dpt. Transport, Ottawa, Ont., airport development, scarifying, runways, etc., to Coastal Asphalt Products, Ltd., Saint John. **$27,338.** Est. $29,300.

N. S., Greenwood — AERODROME — Dpt. Transport, Ottawa, Ont., aerodrome development, clearing, grubbing, grading, etc., to Municipal Spraying & Contg. Ltd., 1350 Barrington St., Halifax. About **$410,000.**

N. S., Shelburne—WHARF—Secy. Dpt. P. Wks., Ottawa, Ont., reconstructing public wharf, to B. Mosher, Bristol Ave., Liverpool. **$62,240.** Bids 9/29. CD 9/22—ENR 9/25.

N. S., Sydney—AERODROME—Dpt. Transport, Ottawa, Ont., aerodrome development, clearing, grubbing, grading, etc., to Standard Paving Maritime Ltd., Capitol Bldg., Halifax. About **$457,000.** Bids 10/2. CD 9/22—ENR 9/25.

N. S., Truro — HANGAR, etc. — Dpt. Natl. Defense for Air, Ottawa, Ont., various bldgs. (hangar), Operational Training unit, to Storms Contg. Co., Ltd., 49 Givens St., Toronto, Ont. **$190,000.**

Ont., Almonte—ARENA RINK—Mississippi Curling Club, c/o M. R. Young, Almonte, 48x170 ft., arena rink, to H. D. Gilmour, Carleton Place. Est. **$27,000.**

Ont., Arnprior—AERODROME—Dpt. Transport, Ottawa, G. W. Yates, secy., aerodrome, clearing, grading, etc., for E. F. T. School, to H. J. McFarland Constr. Co., Ltd., Picton. **$182,630.** Est. $200,000. Bids 9/16. CD 9/12.

Ont., Camp Borden—AIRPORT—Dpt. Natl. Defense for Air, Ottawa, resurfacing, regrading, runways, strips, etc., to W. C. Brennan Contg. Co., Ltd., 300 Gage St. N., Hamilton.

Ont., Hagersville—HANGAR—Dpt. National Defense for Air, Ottawa, hangar, S.F.T. School 6, to W. C. Brennan Contg. Co. Ltd., 409 Gage Ave., Hamilton. **$63,000.**

Ont., Welland—AERODROME—Dpt. Transport, Ottawa, aerodrome development, Relief 2 to Dunnville, to Scott-Jackson Constr. Co. Ltd., 57 Bloor St. W., Toronto. About **$38,300.**

★**Que., Kenogami**—STORAGE DAM—Province of Quebec, Quebec, storage dam on Peribonka River, point known as Passe Dauwesense, Lake St. John Dist., in connection with power development project, Shipshaw, Que., to Dufresne Constr. Co., Ltd., 1832 Boulevard Pie IX, Montreal. Approx. **$3,000,000.** CD 7/25—ENR 10/2.

Que., Ste. Agathe des Monts—POWER DAM—R. Daze, municipality clk., power dam exten., day labor under supervision J. A. Villeneuve, Dpt. P. Wks., Quebec City, Que. Est. **$25,000.**

Que., St. Johns — AERODROME — Dpt. Transport, Ottawa, Ont., aerodrome development, grading, drainage, hard-surfaced runways, to Dibblee Constr. Co. Ltd., 660 Ste. Catherine St. W., Montreal. About **$55,000.**

★**†T. H., Pearl Harbor**—DRY DOCK, etc—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., dry dock, power plant, moorings, additional facilities, Navy Yard, T. H. NOY 5049, to Pacific Bridge Co., 333 Kearny St., San Francisco, Calif. **$15,720,000** cost plus fixed fee basis.

LATIN AMERICA

Mexico—Scrita de Assistencia Publica (Public Welfare Ministry), plans 2 story hospital for incurables at **Tepexpan,** $305,000; Mexican Govt., Palacia Nacional, Mexico, plans 200 kilometer road between Ensenada and San Quintin Baja California Territory, to connect with highway between **Tinjuana, B. C.,** and **San Diego, Calif.,** $615,000.

PUBLIC BUILDINGS

PROPOSED WORK

†Ala., Montgomery—City, plans by R. J. Adams, Tyson Bldg., health clinic bldg., Docket Ala. 1-104. $217,100. **DPW.** CD 10/6—ENR 10/9.

†Ark., Camp Joseph T. Robinson—Con. Q.M., recreation center.

★**Ark., Ozark**—Western Arkansas Housing Auth., rural housing, 15 western Arkansas counties. $500,000.

Ariz., Mesa — Mesa Housing Auth., Mesa, plans by Lescher & Mahoney, Title & Trust Bldg., Phoenix, slum clearance project. USHA. $250,000.

★**Calif., Bakersfield**—Kern County Housing Auth., Court House, Bakersfield, plans by Biggar & McCoy, 554 Haberfelde Bldg., and bids soon, 62 unit Valle Vista housing, Delano; 50 units, Monte Vista Project, Arvin; 60 unit Adelanto Vista Project, Cottonwood Rd. and California Ave.; and 60 unit Rio Vista Project, Beardsley Dist. Total est. over $550,000. USHA. CD 5/7—ENR 5/15.

†Calif., Chico — FLYING SCHOOL IMPROVEMENTS—U. S. Eng., Old Post Office Bldg., Sacramento, facilities for housing 2,200 men, hangars, utility for Army Air Corps Basic Flying School, near here.

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DOES TRIPLE DEFENSE JOB

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**Calif., Fresno**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-203. $15,600.

†**Calif., King City**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-123. $45,000.

†**Calif., La Jolla**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-289. $45,000.

†**Calif., Lancaster**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-231. $45,000.

†**Calif., Paso Robles**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-187. $91,000.

†**Calif., San Miguel**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-170. $95,740.

†**Calif., San Rafael**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-164. $45,000.

†**Calif., Sausalito**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-173. $20,480.

†**Calif., Taft**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-195. $45,000.

†**Calif., Vallejo**—Con. Q.M., 74 New Montgomery St., San Francisco, USO recreation bldg., Docket 4-197. $120,000.

†**Colo., Denver**—School Dist. 1, in City and Denver Co., school, Docket Colo. 5-101 $189,000. **DPW.**

†**Conn., Groton** — Town, plans by E. L. Scholfield, Mercer Bldg., New London, school, Docket Conn. 6-113. $216,000. **DPW.** G. L. Bilderbeck, Starr Hill Rd., Groton, engr. CD 10/6—ENR 10/9.

†**Conn., Groton**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., plans by Payne & Keefe, 231 State St., New London, firestation, laundry bldg., and garage, submarine station, $50,000; plans by E. L. Schoefield, 309 State St., New London, 4 story 65x225 ft. and 2 story, 65x125 ft. brick, rein.-con. warehouse, submarine base; also officers quarters.

★†**Ga., Chickamauga**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., plans by Burge & Stevens, archts. and engrs., Palmer Bldg., Atlanta, 7,000 man camp, 276 bldgs., sewage disposal plant, pump houses, transformer stations, pump. equip., water treatment plant, etc., Snodgrass-Dyer Fields Area, Chickamauga National Military Park.

★†**Ill., Chicago**—Amertorp Corp., c/o American Can Co., 230 Park Ave., New York, N. Y., plans by R. Love, 104 S. Michigan Ave., torpedo plant on southwest side. $9,000,000 incl. equip. Defense Plant Corp. will finance.

Ill., Bushnell—Municipal light and power plant addn.

†**Ind., Huntington**—Hosdreg Co., Inc., Huntington, remodeling former machine shops and building addns. to manufacture anti-aircraft projectiles for Navy Dpt. $60,000 or more incl. equip.

†**Kan., Junction City**—City, 2 recreation centers, Docket Kan. 14-114. $90,000. **DPW.**

†**Kan., Fort Riley**—Con. Q.M., Fort Riley, recreational center.

Kan., Lindsborg—G. D. Johnson, city engr., altering power plant, new generating equip. $105,000.

★**Ky., Frankfort**—Kentucky State College for Negroes, c/o R. B. Atwood, pres., classroom and administration bldg. $200,000, library $150,000, laboratory school $15,000, mechanical arts bldg. and shop equip. $150,000, renovation old bldg. $25,000, home for faculty members $25,000, gymnasium addn. $25,000. Total $600,000.

Ky., Paris—$200,000 bond election Nov. 4, 2 story hospital, for Massie Memorial Hospital, c/o Dr. Purcell, supt., and J. W. Clopfelter, chn. Bldg. Comn., Paris. S. Hannaford & Son, Dixie Terminal Bldg., Cincinnati, O., and S. C. Molloy, Republic Bldg., Louisville, archts.

La., Monroe—Monroe Housing Auth., plans by J. W. Smith & Assoc. and Milton King, Monroe, 50 unit and 75 unit housing, Projects La. 6-1 and La. 6-2. $450,000. USHA. CD 7/24—ENR 7/31.

La., New Iberia—New Iberia Housing Auth., plans by A. Hays Tourl, Baton Rouge, 110 low rent housing units. $400,000. Seeking USHA funds.

★**Me., Augusta**—State Office Bldg. Auth., Gov. Sumner Sewell, chn., Judge L. M. Sanborn, secy., Press Herald Bldg., Portland, state office bldg., rear of state house. $800,000.

†**Md., Aberdeen** — Town, recreation bldg., Docket Md. 18-107. $86,500. **DPW.**

†**Md., Indian Head**—Town, recreation bldg., Docket Md. 18-138. $33,300. **DPW.**

†**Md., Towson**—Comrs. Baltimore Co., 2 recreation bldgs., Docket Md. 18-125. $150,000. **DPW.**

†**Mass., Boston**—General Alloys Co., 405 1 St., plant for manufacture aircraft equip. for War Dpt. $47,163 for land and buildings, $44,000 machinery and equip. Defense Plant Corp. will finance.

†**Mass., Fort Devens**—Con. Q.M., completed plans mess hall, CQM 6101-42-9.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**Mass., Springfield**—United States Housing ★Auth., F St. between 18 and 19 Sts. N.W., Wash., D. C., plans by Royal Barry Wills, 3 Joy St., Boston, 300 defense dwelling units, King Estate, St. James Ave., Hobart and Carew Sts. $1,050,000. CD 9/19—ENR 9/25.

†**Mass., Worcester** — Pub. Bldgs. Admin., FWA, 7 and D Sts. S.W., Wash., D. C., defense housing. Over $150,000.

★†**Mich., Detroit**—Briggs Mfg. Co., 11631 Mack St., soon lets contract 1 and 2 story, brick, steel, rein.-con. manufacturing bldg., 350x1,160 ft., plant for manufacture turrets, for War Dpt. $8,000,000. Defense Plant Corp. will finance. CD 9/26—ENR 10/2.

Mich., Lapeer—State of Mich., Michigan Home & Training School, plans by L. J. Heenan, 609 Peoples State Bank Bldg., Pontiac, brick, steel, rein.-con. cold storage bldg., refrigerating equip. $57,000.

Mich., Sault Ste. Marie—Plans by David E. Anderson, 310 Nester Blk., Marquette, brick, steel, stone, concrete city hall. $200,000.

Minn., Winona—Bd. Educ., bids in spring, Lincoln School. $225,000. Boyum, Schubert & Sorensen, 117 W. Third St., archt. CD 7/16—ENR 7/24.

Minn., Zumbrota — Voted bonds school, for Bd. Educ., G. C. Erredge, clk. $162,425. Ellerbe & Co., 1021 E. First Natl. Bank Bldg., St. Paul, archts. CD 9/24—ENR 10/2.

Miss., Pascagoula — Bd. Supervs. Jackson Co., hospital. $203,741. DPW funds sought.

†**Mo., Fort Leonard Wood**—Con. Q.M., 14 and Farnum Sts., Omaha, Neb., bids soon, recreational center. CD 10/2—ENR 10/9.

★†**Neb., Wahoo**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., Nebraska Ordnance Plant for bomb loading.

†**N. H., Portsmouth**—City, plans by Wells, Hudson & Granger, Main St., Hanover, 7 room brick, steel school, N.H. 27-103. $103,350. DPW. CD 9/16—ENR 9/18.

N. M., Albuquerque—Bd. Educ., national training defense bldg. $204,000. Applied to DPW.

N. Y., Brooklyn — Dpt. P. Wks., Municipal Bldg., reconstructing, altering Greenpoint Hospital. $359,800.

★**N. Y., Brooklyn**—Dpt. P. Wks., Municipal Bldg., New York, Montague branch library, $750,000 incl. site.

★**N. Y., Brooklyn**—Dpt. Hospitals, 125 Worth St., New York, out-patient bldg., Coney Island Hospital. $585,000.

N. Y., Jamaica—Dpt. Hospitals, 125 Worth St., New York, nurses residence, Queens General Hospital. $383,000.

N. Y., Jamaica—Dpt. Hospitals, 125 Worth St., New York, reconstructing pavilion for contagious disease patients, Queensboro Hospital. $173,800.

★**N. Y., Long Island City**—Dpt. Purchase, Municipal Bldg., New York, 3 story, bsmnt., general storehouse, Vernon Blvd. and Nott Ave. $1,363,800.

N. Y., New York—Bd. Higher Educ., 695 Park Ave., exten. chemistry bldg., City College. $172,000.

N. Y., New York—Dpt. Hospitals, 125 Worth St., out-patient bldg. addn. Morrisania City Hospital, Bronx Boro. $304,000.

N. Y., New York—Dpt. P. Wks., Municipal Bldg., barracks for workhouse prisons, Rikers Island Penitentiary. $227,000.

N. Y., New York—Dpt. P. Wks., Municipal Bldg., reconstructing power house, Hart Island Reformatory Prison. $200,000.

N. Y., New York—President Bronx Boro, 851 Grand Concourse, asphalt plant, West Bronx, $330,000.

N. Y., New York—Dpt. Hospitals, 125 Worth St., power plant expansion, Welfare Island. $302,500.

N. Y., New York—Dpt. Hospitals, 125 Worth St., altering Central Nurses Home, Welfare Island. $260,000.

★†**N. Y., Rochester**—Symington-Gould Corp., 20 Symington Pl., plant for manufacture ordnance equip., for War Dpt. $499,005 for land and buildings, $757,100 for machinery and equip. Defense Plant Corp. will finance.

N. Y., St. Albans—Bd. Educ., 110 Livingston St., Brooklyn, P.S. 147 addn., 116 Ave. and 219 St. $475,000.

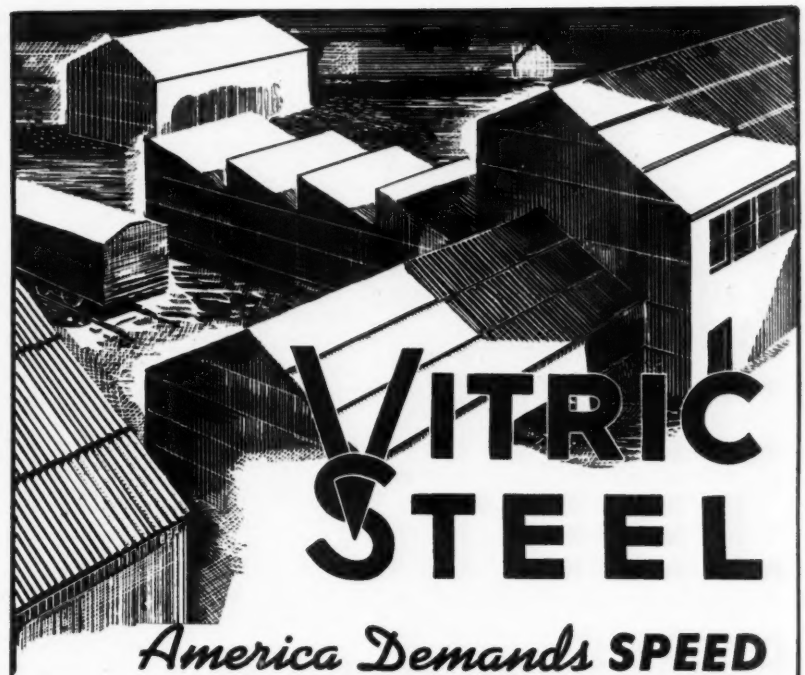
N. Y., St. George—Fire Dpt., Municipal Bldg., New York, central station, Richmond Boro, $284,000.

†**N. C., Fayetteville**—City, soldiers center and community bldg., Winslow St., Docket N.C. 31-105. $75,000. **DPW.**

†**N. C., Morehead City**—Town, recreation bldg., Docket N.C. 31-133. $75,000. **DPW.**

†**N. C., Spring Lake**—Cumberland Co., school, Docket N.C. 31-107. $103,000. **DPW.**

†**N. D., Williston**—Farm Security Admin., 1025-14 St., Denver, Colo., 25 farm units, Buford-Trenton Project. $150,000.



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PUBLIC BLDGS. (Proposed Work, Cont'd.)

★**O., Cincinnati**—Bd. Educ., W. Mietenkoetter, Jr., clk., 216 E. 9 St., $2,000,000 bond election Nov. 4, vocational schools.

★**O., Cincinnati**—Bd. Comrs. Hamilton Co., $1,000,000 bond election Nov. 4, courthouse addn. H. Coates, co. engr. CD 7/23—ENR 7/31.

★**O., Cincinnati**—Bd. Comrs. Hamilton Co., $3,500,000 bond election Nov. 4, county home; $400,000 bonds, county detention home. H. Coates, co. engr. CD 11/14—ENR 11/21.

★**O., Cincinnati**—J. E. Root, dir. P. Wks., $1,500,000 bond election Nov. 4, general hospital addns. H. H. Kranz, city engr.

O., Solon—Solon Village School Dist., Solon, L. J. Kucera, clk., Bedford, $2222,000 bond election Nov. 4, school.

★**†O., South Point**—Atmospheric Nitrogen Corp., subsidiary of Allied Chemical & Dye Corp., 61 Bway., New York, N. Y., chemical mfg. plant, known as Buckeye Ordnance Works, for War Dpt. $22,000,000. Defense Plant Corp. will finance. CD 10/16.

O., University Heights (P. O. Cleveland Heights)—Bd. Educ., W. G. Nesbit, dir., 1743 Lee Rd., plans by J. H. Graham, Hanna Bldg., Cleveland, 2 story, bsmnt., brick, steel school. $150,000.

O., Youngstown — Liberty Twp., Rural School Dist., W. E. Collins, clk., Youngstown, O.R.R. $187,000 bond election Nov. 4, school.

★**O., Youngstown**—Youngstown Metropolitan Housing Auth., 976 W. Federal St., 160 unit low cost housing, Struthers, $800,000; 250 unit low cost housing, Campbell, $1,250,000. Will apply to USHA.

★**O., Zanesville**—Bd. Educ., H. C. Orr, clk., Zanesville, $1,000,000 bond election Nov. 4, Senior High School and repairing existing schools.

★**†Ore., Troutdale**—Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa., 100,000,000 lb. aluminum reduction plant for War Dpt. $10,000,000. Defense Plant Corp. will finance. CD 8/25—ENR 8/28, under Bonneville.

★**†Pa., Brownsville**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., Keystone Ordnance Works for manufacture TNT from toluene.

†Pa., Chester—Pittsburgh Coke & Iron Co., Grant Bldg., Pittsburgh, reconditioning, imprv. blast furnace to produce 120,000 to 144,000 tons pig iron annually. Defense Plant Corp. will finance.

★**Pa., Duquesne**—Allegheny County Housing Auth., 361 County Office Bldg., Pittsburgh, plans by Smithyman & Braziell, 64 Vandergrift Bldg., Pittsburgh, 180 dwelling units, Project Pa. 6-4. $1,200,000. J. Fred Triggs, Berger Bldg., Pittsburgh, engr. site plan, E. T. Wiesmann, Thaw Bldg., Pittsburgh, electrical engr. P. A. Edwards, Wabash Bldg., Pittsburgh, heating engr. Alexander Dzubay, 74 N. Fremont Ave., Pittsburgh, plumbing engr. McCully Engineers, Berger Bldg., Pittsburgh, engr. site survey. CD 4/16—ENR 4/24.

†Pa., East Rochester—Beaver County Housing Auth., 119 9 St., Monaca, rejected bids Oct. 3, 75 defense housing units, Project 36057 X, for USHA. New bids general contract soon. M. Baker, Jr., Rochester, engr. E. S. Tower, 213 Investment Bldg., Pitteburgh, mech. engr. Martsolf, Trent & Bardley, Monaca, archts. CD 10/6—ENR 10/9.

Pa., Pennhurst (P.O. Spring City)—General State Auth., Second and Locust Sts., Harrisburg, postponed indefinitely bids to have been opened Oct. 14, male and female ward bldgs., etc. Pennhurst State School. CD 9/19—ENR 9/25.

★**†R. I., Newport**—Yards & Docks, Navy Dept., 18 St. and Constitution Ave. N.W., Wash., D. C., Naval hospital addn. $190,000; operating base $750,000, fuel depot expansion $150,000, Newport Naval Station.

S. C., Charleston—The Citadel, rejected bids Oct. 11, barracks. $400,000. Lockwood Greene Engineers, Inc., Spartanburg, engr. CD 9/25—ENR 10/2.

†Tenn., Memphis—Fisher Body Div. General Motors Co., General Motors Bldg., Detroit, Mich., plant for manufacture aircraft equip., for War Dpt. $135,775 for land and buildings, $204,745 for equip. Defense Plant Corp. will finance. CD 5/27—ENR 6/5, under CA.

†Tex., Bay City—Town plans by Hedrick & Lindsley, Union Bank Bldg., Houston, recreation center bldg. $166,450. **DPW.** CD 4/7—ENR 4/17.

†Tex., Bay City — City, recreation bldg., Docket Tex. 41-128. $80,000. **DPW.**

Tex., Brownsville — Brownsville Housing Auth., 1402-14 St., bids soon 47 one story, hollow tile, plaster, concrete family dwelling units. $198,000. USHA. C. L. Ellis, Brownsville, archt. G. Hillyer, Brownsville, engr.

†Tex., Corpus Christi—City, A. C. McCaughan, mayor, plans by Hamon & Co., Jones Bldg., 2 story, brick, concrete health center, Docket Tex. 41-182. $100,000, **DPW.** CD 9/10—ENR 9/18.

†Tex., Corpus Christi—Con. Q.M., Fort Sam Houston, recreation bldg.

Tex., Dallas—Bd. Educ., C. M. Moore, bus. mgr., 509 S. Akard St., plans by Lang & Witchell, 1st Natl. Bank Bldg., 2 story brick & concrete high school. $350,000.

Tex., Dumas—Bd. Educ., J. W. Bird, supt., plans by G. A. Carlander, Box 1585, Amarillo, school. $150,000. Applied for DPW funds.

★**Tex., Goose Creek** — Hospital. $550,000. Applying for DPW funds. J. W. Bones, Goose Creek, engr.

★**Tex., Houston**—N. Pickett, mayor, plans by M. J. Sullivan, 3901 Travis St., T.B. hospital. $650,000. CD 10/9—ENR 10/16.

†Tex., Orange—Con. Q.M., Fort Sam Houston, recreation center. $75,000. **DPW.** B. E. Irby, Box 3366, Beaumont, archt. CD 9/16—ENR 9/18.

Tex., Orange—A. Sokolaki, mayor, sub fire station, $50,164. Steinman & Goldman, Box 3267, Beaumont, archts. Applied for DPW funds.

Tex., Terrell—P. I. Austin, town mgr., imprvs., exten. electric lighting plant and distr. sys. $70,000. Albert C. Moore & Co., 2404 Smith-Young Tower, San Antonio, engrs.

†Utah, Ogden—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., postponed indefinitely bids to have been opened Oct. 15, heating sys. for Depot Supply Bldg., Hill Field. CD 10/2.

Utah, Springville—Voted $300,000 bonds enlarging municipal power plant, exten. present water sys. Hugo Price, Provo, engr. CD 9/23—ENR 9/25.

†Utah, Wendover—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., indefinitely postponed bids to have been opened Oct. 9, fire station and guard house, Wendover Bombing Range. Will readvertise. CD 9/26.

†Va., Fredericksburg — Town, recreation bldg., Docket Va. 44-182. $63,000. **DPW.**

†Va., Hopewell—City, recreation bldg., Docket Va. 44-166. $73,000. **DPW.**

†Va., Norfolk—City, recreation bldgs., Docket Va. 44-144, $353,000. **DPW.**

†Va., Norfolk—Naval Public Works Officer, Naval Operating Base, recreation bldg., Docket Va. 44-200. $60,000. **DPW.**

†Va., Richmond — City, recreation bldg., Docket Va. 44-226. $25,000. **DPW.**

†Wash., Bremerton—City, C. C. Casad, Pub. Wks. Comr., recreational center, Docket Wash. 45-133. **DPW.** $150,000.

★**Wash., Tacoma**—Bids soon, furnishing 3 turbines for new power plant, $1,000,000.

†Wash., Seattle—City, County-City Bldg., plans by G. W. Stoddard, Orpheum Bldg., fire station, Harbor Island, Docket Wash. 45-104. **DPW.** $110,779.

★**Wis., Beloit**—Bd. Educ., plans by Law, Law & Potter, 1 S. Pickney St., Madison, high school. $950,000. Applied for $389,000 federal funds.

†Wyo., Fort Francis E. Warren—Con. Q.M., Fort Francis E. Warren, recreational center.

†Alaska, Fairbanks—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., recreation bldg., $20,000. **DPW.**

Que., Dorval—Dom. Govt., Ottawa, Ont., equipment repair garage. $50,000. Dpt. P. Wks., Ottawa, Ont., engr.

BIDS ASKED

Bids Asked October 27

†Pa., East Rochester—Beaver County Housing Auth., 119 9 St., Monaca, 75 defense housing units, Project 36057X, for USHA. M. Baker, Jr., Penn Beaver Hotel, Rochester, engr. E. S. Tower, 213 Investment Bldg., Pittsburgh, mech. engr. A. Martsolf, G. Trent & H. Bradley, 9 St., Monaca, archts. CD 10/15—ENR 10/23.

†Pa., Pulaski—Beaver County Housing Auth., Monaca, 100 defense housing units, Pulaski Twp., Project 36055 X for USHA. CD 10/14.

†Va., Alexandria—Con. Q.M., Standard Oil Bldg., Baltimore, Md., one USO recreation center; adv. ENR 10/23—CD 10/17.

Bids Asked October 29

O., Toledo—Toledo Metropolitan Housing Auth., 392 Nebraska Ave., A. G. Spieker, chn., 17 bldgs. and 196 dwelling units, Port Laurence Homes Housing, Proj. Ohio 6-5, Indiana and Avondale Aves., and 11 and 13 Sts. Mill, Rhines, Bellman & Nordhoff, Inc., 518 Jefferson Ave., archts.

Bids Asked October 30

†Idaho—Bureau Reclamation, Bway. and Julia St., Boise, 1 story, part bsmnt., 26x81 ft. dormitory, Anderson Ranch Dam, Boise Project, 20 mi. north east Mountain Home, Spec. 1573-D. CD 10/10.

Virginia—Dpt. Hys., Office Engineer's Dpt., Central Hy. Bldg., 1221 E. Broad St., Richmond, residency office bldgs., Franklin, Leesburg, Petersburg, and Waverly.

Bids Asked October 31

†Ore., Portland—U.S. Eng., 628 Pittock Blk., property and material storehouse and storage shed also electric lighting and drainage sys. and water supply connection at government moorings, 8010 N.W. St. St. Helens Rd.

BLIC BLDGS. (Bids Asked, Cont'd.)

Bids Asked November 1

La., Lafayette—Farm Security Admin., Lafayette, 2 housing projects, 106 units. 1,400.

Bids Asked November 4

Calif., Los Angeles—Housing Authority of City of Los Angeles, 1031 S. Bway., rada Courts housing 30 apartment bldgs., inistration bldg., Olympic Blvd. near Soto $396,000. Witmer, Watson, Risley & Alex- der, 916 Architects Bldg., archts. CD 7/22— R 7/24.

Bids Asked November 6

La., New Orleans—New Orleans Housing th., 226 Carondelet St., landscaping, clear- demolition, relocating Annunciation St.; paving, etc., for St. Thomas St. ding, Project LA-1-A. A. Owen and H. T. using, Canal Bank Bldg., archts. erwood.

Md., Curtis Bay—Treas. Dpt., Coast Guard t, Curtis Bay, officers quarters, U. S. Coast rd Yard.

Bids Asked November 10

Ia., Paullina—Power plant, incl. diesel en- e, etc. Stanley Eng. Co., Muscatine, engrs. 5/21—ENR 5/29.

Bids Asked November 14

La., Shreveport — Shreveport Housing Auth., Elamite Terrace Housing, Project 2-1, 24 dwelling bldgs. containing 270 elling units, etc. $1,120,000. Extended Neild, Somdal & Neild, City Bank e, archts. CD 10/14—ENR 10/16.

Bids Asked After November 15

Tex., Stephenville—Jno. Tarlton Agricul- tural College, Stephenville and c/o A & M llege Bd. Directors, College Station, 3 and story girls' dormitory $375,000, 4 story boys' rmitory $200,000, 3 story agricultural bldg. 0,000, all concrete, cut stone trim. Total 5,000. A. C. Finn, Banker's Mortgage iz., Houston, archt.

Bids Asked November 17

Ala., Fort Payne—Fort Payne Housing Auth., W. Hill, chn., 48 unit, 1 and 2 story, ick housing, $175,000. M. H. Tardy, Gads- n, archt. E. J. Ladd Eng. Co., Fort Payne, gnrs. CD 10/17.

Bids Asked After December 1

Colo., Crested Butte — Gunnison County lectric Assn., Crested Butte, V. A. Morgan, gpt., power plant and 41 mi. transmission es. $170,000 REA allot. Rocky Mountain g. Co., 201 Wilda Bldg., Denver, engrs. 10/10—ENR 10/16, under Industrial Bldgs.

Bids Asked

Ala., Mobile—U. S. Eng., Federal Bldg., superstructure, warehousing, etc., atop ks in connection with ocean terminal. B. Converse & Co., Inc., Wilson Bldg., chts. and engrs.

Calif., Burbank—Vega Airplane Corp., 2555 N. Hollywood Way, (selected list con- actors) plant addns., warehouse, paint ngar and flight hangar, office addn., etc. for ar Dpt. $1,822,713. Defense Plant Corp. ill finance. Parkinson & Parkinson, 434 Title surance Bldg., Los Angeles, archts. CD 16—ENR 9/18.

R. I., Newport—Pub. Wks. Officer, Naval raining Station, recreational amphitheatre, ce utilities, etc., Training Station, Spec. 4677.

OW BIDDERS

Calif., Los Angeles—Los Angeles Housing uth., 1031 S. Bway., Oct. 14, 185 unit Ha- enda Village Housing, Project 4-10, from P. Dentzel, 453 N. Rodeo Dr., Beverly lls., **$386,931.** CD 10/2—ENR 9/18.

Calif., Mare Island—Pub. Wks. Officer, Mare land, Oct. 8, 20 officers quarters, consisting duplex quarters bldgs., Mare Island Navy rd, Spec. 10626, from J. Jansen, 3833 Frank- n Blvd., Sacramento, **$194,987.** CD 9/11— NR 9/18.

Ia., Woodward—State, Des Moines, Oct. 14, neral contract boys' custodial bldg., Wood- rd State Hospital, from Kucharo Constr. , 1901 Easton Blvd., Des Moines, **$180,980;** lumbing and heating, from Wheatland Co., 17 1 Ave. S.E., Cedar Rapids, **$34,900.** CD 9/3—ENR 10/9.

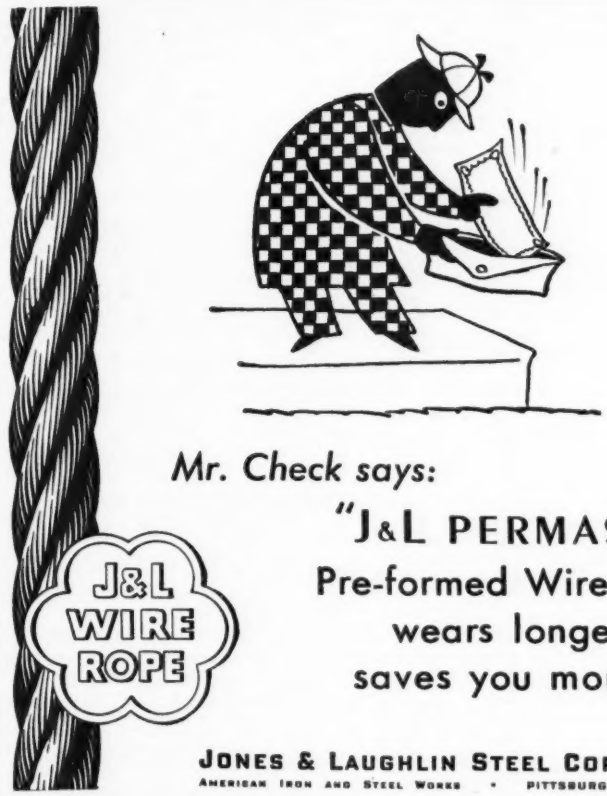
Ill., Savanna—Con. Q.M., Savanna Ordnance epot, Proving Ground; Oct. 1, gate houses, ntry houses, carpenter shop, oil storage bldg. avanna Ordnance Depot, from Hagstrom onstr. Co., 490 N. Snelling Ave., Minneapolis, inn., **$73,250.**

Kan., Kansas City—Pub. Bldgs. Admin., FWA, 7 and D Sts. S.W., Wash., D. C., ct. 15, 350 defense housing units, Project 1031X, from J. E. Dunn Co., Inc., Reliance ldg., (1) **$1,387,242,** (2) **$1,536,842.** CD 9/26.

Md., Aberdeen—Con. Q.M., Oct. 15, 1 story, 225 x 545 ft. assembly shop, Aberdeen roving Grounds, from Baltimore contractors, 2 N. Central Ave., Baltimore, **$546,000.** Est. 425,000.

Md., Annapolis—Yards & Docks, Navy Dpt., St. and Constitution Ave. N.W., Wash., C., instruction and storage bldg. and rifle ange, Naval Academy, Spec. 10486, from J. B. raun Constr. Co., 575 4 Ave., Brooklyn, N. Y., 47,832.

N. H., Portsmouth—Yards & Docks, Navy ept., 18 St. and Constitution Ave. N.W., ash., D. C., Oct. 15, brick, steel, concrete rison, Portsmouth Navy Yard, Spec. 10506, rom New England General Contg. Co., 341 tate St., New Haven, Conn. **$230,000.** CD 10—ENR 10/2.



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PUBLIC BLDGS. (Low Bidders, Cont'd.)

†**N. J., Cape May**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., Oct. 8, altering Bldgs. 129 and 132, Naval Air Station, from George H. Evans & Co., 1126 Fairmount Ave., Phila., Pa., Items (1) **$58,910**, (2) **$6,905**. CD 10/2.

★**N. Y., Suffern**—Bd. Educ. Central School Dist., Suffern, Oct. 14, Junior and Senior high school, Ramapo Twp., from Fred J. Brotherton, Inc., 200 Main St., Hackensack, N. J., **$528,244**. CD 9/29—ENR 10/2.

N. C., Fayetteville—Fayetteville Housing Auth., Oct. 15, two 56 unit housing, Projects NC 9-1 and NC 9-2, from McDevitt & Street, Charlotte, **$252,980**; plumbing, from J. L. Powers, Bennettsville, S. C., **$47,000**. CD 8/28—ENR 9/4.

O., Columbus—Bd. Trustee Ohio State University, C. E. Steeb, secy., Oct. 10, general contract 3 story, 90x210 ft., brick, steel agriculture laboratory bldg., from Norton & Nadalin, 45 S. Sixth St., **$309,400**. CD 9/24—ENR 10/2.

†**O., Dayton**—U. S. Eng., Wright Field, Sept. 30, rein-con., brick, steel aircraft laboratory and test bldg., plain fdn., from Frank Messer & Sons, Inc., 2515 Burnet St., Cincinnati, **$325,951**. CD 9/26.

†**Pa., Aliquippa** — Beaver County Housing Auth., R. Bennett, chn., Court House, Beaver, Oct. 10, 50 defense housing units, Project 36057X, for USHA, from J. W. Ryan Constr. Co., Inc., 369 Lexington Ave., New York, N. Y. **$241,800**. CD 9/2—ENR 9/4.

Tex., Winters—T. A. Smith, mayor, Oct. 23, Sect. B, generating units, from Fairbanks-Morse Co., 1713 N. Market St., Dallas, **$93,726** ***Sect. A, power plant bldg., from Ross Constr. Co., Box 222, San Angelo, **$25,563*** Sect. C, overhead electric distr. sys., from Walco Eng. & Constr. Co., 2408 E. 4 Pl., Tulsa, Okla., **$69,123**. CD 9/30—ENR 10/2.

†**Va., Dublin**—Farm Security Admin., 227 E. Adenton St., Raleigh, N. C., Oct. 13, 8 dormitories and utilities serving 12 dormitories, from Barger Bros., Mooreville, N. C., **$166,484**. CD 10/9.

CONTRACTS AWARDED

★†**Ala., Gadsden**—Republic Steel Corp., C. A. Thayer, Ch. Engr., Republic Bldg., Cleveland, O., 800 ton blast furnace and battery coke ovens, to Rust Eng. Co., Martin Bldg., Birmingham. Est. **$10,000,000**. Defense Plant Corp. will finance. CD 10/10—ENR 10/16.

Calif., Exeter—Exeter High School Dist., Trustees, high school addns., to L. H. Hansen & Sons, P. O. Box 1784, Fresno. **$161,715**. Bids 10/6. CD 9/16—ENR 9/18.

★**Calif., Los Angeles**—Dpt. Water & Power, 207 S. Bway., water tunnels for harbor steam plant, Wilmington, to American Concrete & Steel Pipe Co., 4635 Firestone Blvd., Southgate, **$618,750**; Bids 10/13, CD 10/15—ENR 9/25, under WW; intake and discharge structure and wharves for same, to Elliott Stroud-Seabrook, 112 W. 9 St., **$528,092**.

★**Calif., Los Angeles**—Housing Auth., 1031 S. Bway., general contract 285 unit Rancho San Pedro housing, Project Calif. 4-4, to Aetna Const. Co., 641 S. Witmer St., **$988,663*** plumbing and heating, to Howe Bros., 1198 S. San Pedro St., **$164,750**. Bids 8/19, awarded 10/17. CD 8/21—ENR 8/28, under LB.

Calif., Oakland—Oakland High School Dist., 1 story, wood frame Montclair School, to W. G. Thornally, 2059 Webster St. **$151,835**. C. A. Whitton 2 Ave. and 10 St., engr.

†**Fla., Fort Barrancas** — Con. Q.M., radio shelter, 3 ordnance warehouses, repair shop, administration bldg., to F. L. Bray, Battle House Hotel, Mobile, Ala. **$151,479**.

†**Ga., Fort Benning**—Con. Q.M., parachute bldg., to Williams Lumber Co., 1038-13 St., Columbus. **$184,145**.

†**Ga., Hinesville** — Farm Security Admin., Montgomery, Ala., farm security project, to Southeastern Mfg. Co., Tuscaloosa, Ala. **$207,-520**. Bids 7/14. CD 7/1.

†**Ga., Macon**—Con. Q.M., Camp Wheeler, 3 recreation bldgs., to A. R. Abrams, Commercial Exch. Bldg., Atlanta, about **$160,000**. CD 10/9—ENR 10/16.

Ill., Dupo—Dupo Community High School Dist. 195, of St. Clair Co., c/o Bd. Educ., 2 story, bsmnt., mezzanine, 127x234 ft. and 39x110 ft., brick, rein.-con. high school, to F. Ganschinietz, 501 N. 18 St., East St. Louis, **$152,518**; heating and plumbing, to R. Metzger, 1206 State St., East St. Louis, **$65,498**. Bids 9/30. CD 9/26.

★†**Ill., Great Lakes**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., D. C., hospital corps training school, to The George Sollitt Constr. Co., 109 N. Dearborn St., Chicago. **$500,000**.

†**Ill., Savanna**—Con. Q.M., laundry bldg., bldg. for housing stand-by unit and ramp enclosures for bomb plant, Savanna Ordnance Depot, to Hagstrom Constr. Co., 490 Snelling Ave. N., St. Paul, Minn., **$60,098**.

Ind., West Lafayette (br. Lafayette)—Purdue University, Lafayette, 2 story, 128x140 ft. Wesley Foundation Bldg., to K. H. Kettlehut, 432 Wood St., Lafayette. Est. **$200,000**. E. F. Jansson, 740 Rush St., Chicago, Ill., archt.

★†**Ia., Burlington**—Pub. Bldgs. Admin., 7 and D Sts. S.W., Wash., D. C., 200 dwelling units for ordnance plant, Project 13014 X, to Lovering Constr. Co., 389-3 Ave., St. Paul, Minn. **$733,678**. CD 7/10—ENR 7/17.

†**Mass., Springfield**—American Bosch Corp., 2664 Main St., 1 story, bsmnt., 150x700 ft., brick, steel, rein-con. factory, for Navy Dpt., to Brown & Matthews, Inc., 122 E. 42 St., New York, N. Y. Est. **$300,000**. Bids 8/29. Defense Plant Corp. will finance. CD 8/25.

†**Mass., Springfield**—Con. Q.M., Springfield Armory, 60x180 ft., brick, stone field service unit addn., Pearl and Federal Sts., to Casper Ranger Constr. Co., 6 Newton St., Holyoke, Est. **$125,000**. McClintock & Craig, 458 Bridge St., engrs.

Mich., Travers City—Furnishing, erecting turbine generator unit in power house, to Elliott Co., Jeannette, Pa. **$67,316**; surface condenser, to C. H. Wheeler Mfg. Co., 19 St. and Lehigh Ave., Phila., Pa., **$22,850**. CD 9/10—ENR 9/18.

†**N. J., East Paterson**—Wright Aeronautical Corp., 132 Beckwith Ave., Paterson, 1 story, brick, steel oil storage bldg., River Rd., for War Dpt., to Mahoney Troast Constr. Co., 657 Main Ave., Passaic. Defense funds involved.

★†**N. Y., Massena**—Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa., foundations for 66 bldgs. for manufacturing aluminum, to P. J. Carlin Constr. Co., 101 Park Ave., New York, N. Y. Est. **$1,000,000**. Defense Plant Corp. will finance. Bids 10/1. CD 8/25—ENR 8/28.

★**N. Y., New York**—Dpt. P. Wks., Municipal Bldg., exten. William Hallock Park Biological bldg. $1,000,000.

†**N. C., Camp Davis**—Con. Q.M., 2 motor repair shops, oil house, grease-wash rack, to F. N. Thompson, 145 Brevard St., Charlotte, **$86,400**. Bids 10/7. CD 9/20—ENR 10/2.

†**N. C., Wilmington**—Con. Q.M., 494 Spring St. N.W., Atlanta, Ga., 4 USO recreation bldgs., to A. R. Abrams, Commercial Exchange Bldg., Atlanta, Ga. About **$190,000**. CD 9/3—ENR 9/11.

★†**Pa., Clairton**—Div. Defense Housing, FWA, 18 and F Sts. N.W., Wash., D. C., 138 defense housing units, Project 36152X, to Dick Constr. Co., 2532 Library Rd., Pittsburgh, **$1,260,000**. CD 10/9—ENR 10/16.

★†**Pa., West Mayfield**—Beaver County Housing Auth., R. Bennett chn., 119-9 St., Monaca, 170 defense housing units, Project 36054X, for USHA, to J. O. Burgwin, Professional Bldg., Pittsburgh, **$755,700**. CD 10/9—ENR 10/16.

S. C., Aiken—Housing Auth., Valley Homes, Proj. SC 7-2, to Townsend Lumber Co., Anderson, **$287,327**; Stoney Homes, Proj. SC 7-2, to Hardin & Ramsey, 161 Spring St., Atlanta, Ga., **$121,882**. CD 9/23—ENR 9/25.

★**Tex., Dallas**—Dallas Housing Auth., 3525 Lucas Dr., Cedar Springs housing, 220 units, Tex. 9-3, USHA, to Will O'Connell, Austin, **$778,565**. Bids 9/22. CD 9/26—10/2, under LB.

Tex., Lufkin—Angelina Co., c/o Judge, Lufkin, 2 to 3 story, part bsmnt., brick, rein.-con. hospital, **WPA, $210,000**. CD 6/30—ENR 7/3.

†**Wis., Milwaukee**—Globe-Union, Inc., 900 E. Keefe Ave., general contract steel, brick warehouse and manufacturing bldgs., to Selzer-Ornst Co., 6222 W. State St.***steel work, to Worden-Allen Co., Pt. Washington Rd.*** plumbing, to Jos. Wittig Co., 1135 N. Water St. Est. **$400,000**. Navy Dpt. will finance. Geo. Schley & Sons, 735 N. Water St., archts. CD 10/1—ENR 10/9.

Ont., Barriefield—Dpt. National Defense, Ottawa, Ont., 30 additional bldgs., Royal Canadian Corps of Signals Depot, to W. C. Brennan Contg. Co. Ltd., 400 Gage Ave. N., Hamilton. **$300,000**.

Ont., Collingwood—Wartime Housing, Ltd., 55 York St., Toronto, 100 bungalow-type houses, to Hill-Clark-Francis, Ltd., New Liskeard. About **$200,000**. CD 9/4—ENR 9/18.

Ont., Toronto—Dpt. National Defense, Ottawa, 2 warehouses, Fleet St., Queen's Quay, to Carter-Halls-Aldinger Co. Ltd., 419 Cherry St. **$70,000**.

Que., St. Dommique—Dpt. National Defense, Ottawa, storage plant, to Dufresne Constr. Co., Ltd., 1832 Blvd. Pie IX, Montreal, **$400,000**.

COMMERCIAL BUILDINGS

PROPOSED WORK

Colo., Denver—St. Mary's Catholic High School, c/o Architect, plans by J. K. Monroe, 2150 Curtis St., 2 story school. $150,000.

Conn., Stamford — Maurice Hertz, High View Farm, Den Rd., sketches residential development on 50 acres, High View. Over $150,000.

Conn., Stamford—Lawrence M. Strauss, 8 Mildred Parkway, New Rochelle, N. Y., residences, 25 acre site, Hunting Ridge Rd. Over $150,000.

Ill., Chicago—Sheldon Building Corp., c/o Aberman, 843 W. Castlewood Terrace, plans by M. L. Kroman, 180 N. Michigan Ave., rebuilding 2 story, 125x150 ft. store, Milwaukee and Spaulding Aves. $150,000.

Mass., Boston—Owners, c/o T. Dennie, Reginald and G. D. Boa[illegible], 36 Ames concrete, brick, steel [illegible] bldg. bury St. Over $150,0[illegible]

Mass., Worcester—M[illegible] Belmont St., soon let[illegible] tract, brick stone hospital, Belmont [illegible] $155,000 Curtin, Mason & Riley, archts, G. Adolph Johns[illegible] 350 Main S ton, assoc. archt. CD 2[illegible]—ENR 1.

N. J., West Orange—[illegible] Essex Co. Club, Hutton Park, soon lets contra story, bsmnt., 68x212 ft. overall, brick country club house, Prospect Ave. Hunter McDonnell, 101 Park Ave., New archt.

★**N. Y., New York**—One Thousand Hundred and Eleven 5 Ave., Inc. Kaufman, pres., 18 E. 48 St., plans by Roth & Sons, 18 E. 48 St. 18 story and house, 100x177 ft. apartment, 1109-1113 $800,000.

N. Y., New York—Three Hundred Wenty-Second St. Constr. Co., Inc., 3 Cortland Ave., plans by H. H. Lilien, E. 149 St., 6 story, 61x90 ft. apartment West End Ave. $150,000.

N. Y., New York—J. S. Wickler, 1351 cobel Ave., plans by H. Lilien, 215 E. 6 story, 85x100 ft. apartment, 51 W. $160,000.

N. Y., New York—J. Wickler, 1351 Ave., plans by H. H. Lilien, 215 E. 6 story, 84x175 ft. apartment, Anthony near Burnside Ave. $250,000.

O., Berea—Bd. Trustees Baldwin-W College, L. C. Wright, pres., physical tion bldg. $150,000.

O., Cleveland—Workmen's Housing c/o W. F. Bennett, Jr., pres. (and a 2341 Carnegie Ave., 100 homes, Brookpar Biddulph Rds. $450,000.

S. C., Greenville—M. C. Davenport, F lin Natl. Life Bldg., 48 unit apartment 000.

Tex., Houston—C. E. King, Esperson B 50 brick veneer, asbestos siding, dwellings $250,000.

BIDS ASKED

Bids Asked About November 10

Ill., Maywood—Paramount Pictures, 1306 S. Michigan Ave., Chicago, theat Ave. and Warren St. $250,000. Rapp & R 230 N. Michigan Ave., Chicago, archts. 9/10—ENR 9/18.

CONTRACTS AWARDED

Ark., Ft. Smith—R. N. Donoho, 50 dences, to C. L. Durbin & Wendell John Ft. Smith. **$150,000**.

Ark., Ft. Smith—Flocks Constr. Co. residences. Owner builds. $150,000.

Conn., Bridgeport — Sound View Vil Inc., Sylvan Ave., 100 frame homes, 35 site, Ehrsam Farm, to City Constr. Co., van Ave. Est. **$450,000**.

Conn., Hamden—Gilbert Homes, Inc., Whitney Ave., 50 frame homes, Valley Rd Gilbert Ave. Owner builds. $150,000.

Conn., Hartford—V. Gallagher, c/o W. caze, archt., 211 E. 48 St., New York, two dred 1½ story dwellings, Tower, Morning and Canaan Sts., to W. L. Crow Constr. 101 Park Ave., New York, N. Y. Est. $700 to **$1,750,000**. CD 8/22—ENR 8/28.

Conn., New Britain—St. Ann's R. C. Chu 47 Clark St., superstructure 1 story, 1 ft., brick, steel, stone church, to E. Constr. Co., 94 Wells St., Bridgeport. **$155,000**. CD 10/3—ENR 10/9.

Ill., Chicago—Birchwood Beach, Inc., Burnham & Hammond, Inc., archt., 140 LaSalle St., 3 story, 150x190 ft. apartm Chase Ave. and Sheridan Rd., to J. Bldg. Constr. Co., 3735 N. Clark St., York, N. Y. Est. **$250,000**.

★**Ill., Elmhurst**—A. W. Komarek & Berwyn, 600 prefabricated sheet dwellings near here, to Steel Buildings, 75 E. Wacker Dr., Chicago, est. $2,500,000.

Mich., Detroit—Henry Estate, 1702 Bldg., Detroit, brick, steel, rein.-con. the to Barton-Mallow Co., 2631 Woodward Est. **$150,000**. CD 9/15—ENR 9/18.

N. J., Clifton and Passaic—Sunset Corp., 85 Hammond Ave., Passaic, forty story, bsmnt., 24x30 ft. homes, Terhune separate contracts. **$160,000**. P. J. Pa 625 Main Ave., Passaic, archt. CD ENR 2/27.

N. J., Cranford—Home Club Bldrs. 189 Market St., Newark, fifty 1½ and story, bsmnt. homes, Oneida Pl., separ contracts. **$200,000**.

N. J., North Plainfield—Home Club Bld Inc., 189 Market St., Newark, forty-one story, bsmnt. homes, Greenbrook Rd., separ contracts. **$164,000**.

N. J., Raritan—Clipper Homes Corp. tennial Bldg., Cranford, 100 two story, frame, shingle homes, Route 28, separate tracts. **$450,000**. O'Hara & Edson, 9 E. St., New York, archts.

COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

N. Y., Brooklyn—J. H. Bldg. Corp., 80 Lefferts Ave., 6 story, 120x122 ft. apartment, 1911 Ocean Ave., separate contracts. **$250,000.** Sheelig & Finkelstein, 153 Pierrepont St., archts. CD 10/3—ENR 10/9.

N. Y., New York—Two Hundred and Forty-Five East Thirty-Seventh Street, Inc., 2015 Foster Ave., Brooklyn, 6 story, 80x108 ft. apartment, 685 2 Ave., separate contracts. **$160,000.** W. T. McCarthy, 44 Court St., Brooklyn, archt. CD 10/3—ENR 10/9.

N. Y., New York—Valcourt Realty Corp., 995 Bway., 6 story, 90x92 ft. apartment, 223 W. 61 St., separate contracts. **$200,000.** J. M. Nelson, 250 W. 57 St., archt. CD 10/9—ENR 10/16.

Pa., Pittsburgh—Kirwel Co., c/o L. Wells and J. Heselbarth, 506 S. Main St., general contract 50 residences, Kennedy Twp., near here, to C. E. Hudson, 134 Singer Ave., McKees Rocks. Est. **$150,000.**

Pa., York—C. MacDonald, c/o Southern Theatre, York, Mayfair theatre and store, N. George St., separate contracts. **$150,000.** CD 10/14—ENR 10/16.

Tex., Houston—Houston Ready-Cut House Co., 2601 Polk St., 30 dwellings, Crane St. Woods. Owner builds. **$150,000.**

Alta., Lethbridge—Church of Latter Day Saints, Sherlock Bldg., church and hall, day labor. **$150,000.** Architect, c/o Dr. Spackman, Sherlock Bldg., Lethbridge. CD 3/6—ENR 3/13.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Berkeley—PLANT—Durkee Famous Foods, 2900 Fifth St., plant expansion. $40,000 or more.

★**Calif., Buttonwillow**—GENERATING FACILITIES—Pacific Gas & Electric Co., 245 Market St., San Francisco, generating facilities at Midway Steam Plant. $6,850,000.

Calif., Oakland—PLANT—G. R. Borrmann Steel Co., 25 8 St., plant expansion. $45,000.

Calif., Oakland — WAREHOUSE — Consolidated Freightways, 1700 24 St., completing plans by A. Froberg, 3454 Harlan St., 1 story, rein.-con. warehouse. $40,000. CD 1/22—ENR 1/30.

Calif., Oakland — WAREHOUSE — Jackson Furniture Co., Clay St. between 13 and 14 Sts., warehouse addns. $40,000.

Calif., Oakland—TRUCK TERMINAL—Merchants Express Corp., Ferry and Freight Sts., plans by Miller & Warnecke, Financial Center Bldg. $40,000.

Calif., Oakland—FACTORY—Romak Iron Wks., 915-18 St., factory. $40,000.

Calif., San Francisco — PLANT — Seven-up Bottling Wks., San Bruno Ave. and Hilton St., bottling plant addn. $40,000.

Conn., Bridgeport—FREIGHT TERMINAL—New England Transportation Co., 220 N. Washington Ave., 1 story, 95x115 ft., brick, steel freight terminal, Hollister Ave. $41,000.

Conn., Norwalk—FACTORY—N. V. Maatschappij Voor Chemische en Pharmaceutische Producten, Hamilton St., Stamford, plans by D. Mansell, 24 Park Row, Stamford, altering 5 brick, steel, factory units. Over $40,000.

★**Idaho, Nampa**—FACTORY—Amalgamated Sugar Co., Ogden, Utah, sugar factory. $2,000,000.

Ia., Ottumwa—CANNING—John Morrell Co., Ottumwa, soon lets contract, 7 story, brick, rein.-con. canning bldg. Over $300,000. Henschein, Everds & Crombie, 59 E. Van Buren St., Chicago, Ill., engrs.

★**Ky., Danville**—POWER PLANT—East Ky. Rural Electric Co-operative Corp., Maysville, steam-electric generating station, near here, exten. lines in eastern Kentucky. $2,000,000 REA allot.

★**Ky., Tyrone**—POWER PLANT—Kentucky Utilities Co., J. E. Brown, pres., 1st Natl. Bank Bldg., Lexington, sketches brick, rein.-con. steam electric generating plant. $3,000,000. Sargent & Lundy, Inc., 140 S. Dearborn St., Chicago, Ill., engrs.

Mich., Detroit — FACTORY — Odel Tool & Die Co., 8820 Grinell St., plans by F. Eurich, Jr., 1126 Detroit Savings Bank Bldg., 1 story, brick, steel, concrete tool and die shop addn. $50,000.

N. J., Cliffside Park—BUS TERMINAL and GARAGE—Orange & Black Bus Line, 25 Orient Way, Rutherford, 1 story, part bsmnt., brick, steel bus terminal and garage, Edgewater Rd., $75,000.

N. J., Kearny—FREIGHT TERMINAL—Masters Fast Freight Co., Lister Ave., Newark, plans by P. Friedman, 44 Commerce St., Newark, 1 story, 40x80 ft., concrete, brick, steel freight terminal, Jacobus Ave.

N. J., Morris Plains — PLANT — Aldernay Dairy Co., Morris Plains, soon lets contract 40x48 ft. pasteurizing plant. $40,000. W. E. Lehman, 972 Broad St., Newark, archt.

N. J., Newark—PLANT—Purolator Products, Inc., 365 Frelinghuysen Ave., rejected bids Oct. 10, 1 story, 100x155 ft., brick, concrete oil filter factory top addn. W. Newmann & Sons, 587 Summit Ave., Jersey City, archt. CD 10/7—ENR 10/9.

N. J., Perth Amboy—WAREHOUSE—Green-Span Bros. Co., 369 Herbett St., soon lets contract, 1 story, brick, steel grocery warehouse. The Ballinger Co., 105 S. 12 St., Phila., Pa., archt. and engr.

N. Y., Long Island City — FACTORY—Liquidometer Corp., 36-16 Skillman Ave., plans by C. M. Lobejager, 54-19 Roosevelt Ave., Woodside, 2 story factory, 41-95 36 St. $50,000.

O., Athens—POWER HOUSE, etc.—N. Y. Coal Co., P. C. Morris, genl. mgr., Athens, new power house, tipple, Coal Mine 25, to replace units, destroyed by fire. $50,000.

O., Cleveland—FACTORY—Cleveland Wire Spring Co., J. W. Campbell, pres.-treas., E. 49 St. and Harvard Ave., brick, steel, concrete factory. $75,000.

O., Cleveland—FACTORY—Columbia Electric Mfg. Co., A. Friedman, pres., 4519 Hamilton Ave., plans by Christian, Schwarzenberg & Gaede, 1836 Euclid Ave., brick, steel factory, remodeling 3 story bldg. $125,000.

O., Gallipolis — GENERATING PLANT — Buckeye Rural Electric Co-operative, Inc., J. R. Lusher, supt., Gallipolis, electric generating plant. $250,000 REA allot.

O., Wilmington—FACTORY—S. Frieder & Sons Co., A. Frieder, pres., 246 Main St., Cincinnati, cigar factory. $100,000.

★**Ore., Portland**—WAREHOUSES, etc.—Commercial Iron Wks., W. W. Casey, pres., foot of S. W. Grover St., 2 warehouses, 2 coverede shipways, exten. office bldg., mold loft, outfitting dock, etc. $500,000.

Pa., Bethlehem—GAS PLANT—Allentown-Bethlehem Gas Co., Commonwealth Bldg., Allentown, gas-making plant unit addn., Coke Works Rd. plant. $40,000.

Pa., Erie—BULK PLANT—Socony Vacuum Oil Co., J. R. Taylor, purch. agt., 26 Bway., New York, N. Y., completed plans 2 story, 50x125 ft., brick bulk plant, warehouse, 6 storage tanks, unloading docks, etc., East Lake Rd., $100,000. A. E. Esser, 1500 Walnut St., Phila., company engr. E. M. Harvey, Jr., 1500 Walnut St., Phila., div. engr.

Pa., Jeannette—WAREHOUSE—H. L. Widom, archt., Granit Bldg., Pittsburgh, Pa., soon lets contract, 2 story, bsmnt., 60x122 ft., brick, steel, concrete block furniture warehouse, Magee St., for Frank Levin Furniture Co., F. Levin, chg.

Pa., Pittsburgh—PLANT—S. L. Roush, archt., 1210 Chamber of Commerce Bldg., soon lets contract, 3 story, 100x100 ft., brick, steel plant, addn., for Kerotest Mfg. Co., E. G. Mueller, pres., 2525 Penna Ave. $100,000.

R. I., Phillipsdale—WAREHOUSE, etc.—Bird & Son, Inc., East Walpole, Mass., soon let contract 1 story, 154x360 ft., brick, warehouse and dryer bldg. Over $40,000. Ganteaume & McMullen, 99 Chauncy St., Boston, Mass., engrs.

Tex., Corpus Christi—WAREHOUSE—C. & M. Childress, 206 N. Water St., plans by M. Levy, Medical Arts Bldg., 1 story, 100x160 ft., brick, concrete, steel warehouse. $40,000.

Tex., Dallas—BAKERY—Mrs. Bairds Bread Co., 1401 N. Carroll St., bids soon 90x106 ft. brick, concrete bakery. B. C. Hill, Coke Bldg., engr.

Tex., Dallas—MANUFACTURING PLANT—McElreath Electrotyping Co., 1408 Marilla St., Dallas, bids soon 1 story, 50x150 ft. brick, concrete, steel plant. $50,000. J. A. Pitzinger, Southland Life Bldg., Dallas, archt.

Tex., McAllen—PROCESSING PLANT — St. Clair Foods Co., 90x90 ft. citrus and fruits processing plant, metal, concrete. $40,000 with equip.

Wis., Green Bay—STORAGE and SHIPPING—Larsen Co., 1 story, 30x640 ft. storage and shipping bldg.

Man., Winnipeg—PLANT—MacDonald Bros., 50 Robinson St., aircraft plant exten. $100,000. Dpt. Munitions & Supply, Ottawa, Ont., engr.

Ont., Belleville—PLANT — Bristol Aircraft Products, Ltd., 14 Moira St., plant addn.

Ont., Hamilton—PLANT—Hutton & Souter, archts., Pigott Bldg., soon lets contract, 3 story, brick, tile East End plant addn., for Canadian Westinghouse Co., Ltd., 288 Sanford Ave. N. **$60,000.**

Ont., London—FACTORY—J. I. Case Co., 88 York St., soon lets contract 1 story, 110x185 ft., brick, tile, steel factory. $80,000. L. G. Bridgeman, Royal Bank Bldg., archt.

Ont., Long Branch—PLANT—Allward & Gouinlock, archts., 57 Bloor St. W., Toronto, soon lets contract, plant exten. for Small Arms, Ltd., Lake Shore Rd., Long Branch, about $200,000.

Ont., Niagara Falls—PLANT—Morris Crane & Hoist Co., Ltd., 7 Stanley St., plans by Findlay & Mann, 449 Queen St., 1 story, bsmnt., 47x95 ft., brick plant, concrete fdn. $40,000.

Ont., Toronto—PLANT—Mathers & Haldenby, archts., 96 Bloor St. W., bids soon, plant exten., for Campbell Soup Co., Ltd., 1 St. $150,000.

Ont., Toronto—PLANT—H. Disston & Son, Ltd., 2 Fraser Ave., rejected bids, plant extension, $40,000. Will readvertise. Shoemaker & Burnham, 45 W. Richmond St., engrs.

Ont., Toronto—PLANT—McCall-Frontenac Oil Co., Ltd., 117 Harbour St., bids soon new blending plant on refinery property, Cherry St. $250,000.

Ont., Toronto—PLANT—W. D. Beath & Son, Ltd., 394 Symington Ave., plans by S. Smith, 25 Melinda St., 2 story, 36x130 ft., rein.-con., brick plant exten., $40,000.

Ont., Toronto—PLANT—Jones Bros. Ltd., 858 Dupont St., paper mfg. plant, $40,000.

Ont., Toronto—PLANT—S. F. Smith, archt., 25 Melinda St., bids soon plant exten., for Standard Ultramarine Co. of Canada, Ltd., 132 St. Helen's Ave. About $60,000.

Que., Chicoutimi—PLANT—Quebec Pulp and Paper Co., Ltd., remodelling plant for munition mfg. $70,000.

Que., Montreal—PLANT—Ross & MacDonald, archts., 1010 St. Catherine St. W., soon lets contract, printing plant addn., 6306 Park Ave., for Ronalds Co. Ltd., 6306 Park Ave. $50,000. CD 9/23—ENR 9/25.

Que., Montreal — PLANT — Johnson Wire Works, Ltd., 4760 Dagenais St., 1 story, 73x318 ft., steel, brick plant addn., concrete fdn. $80,000. J. Pringle & Son, Ltd., 48 S. McGee St., engr.

Que., Three Rivers—PLANT—Canadian International Paper Co., Ltd., Sun Life Bldg., Montreal, pulverizing and coal handling plants. $350,000.

BIDS ASKED

Calif., Torrance—FACTORY—National Supply Co., 1524 Border Ave., steel factory addn. Over $40,000. Taylor & Taylor, 803 W. 3 St., Los Angeles, archt. and engr. CD 9/23—ENR 9/25.

Wis., Eau Claire—GARAGE—Schumacher Motor Express Co., 807 S. Oxford Ave., 1 story, part bsmnt., 55x100 ft., brick, steel garage. H. M. Nelson, 204 E. Grand Ave., archt.

Wis., Sturgeon Bay—WAREHOUSE, etc.—M. W. Miller & Co., 3 story, 40x106 ft., brick, concrete warehouse and cold storage bldg. W. J. Bernhard, Ephraim, archt.

LOW BIDDERS

N. C., Fayetteville—LAUNDRY—Mayflower Co., Oct. 7, laundry addn., imprvs., from Reinecke-Dillehay, Inc., Fayetteville. **$72,500.** B. G. Laslett, Fayetteville, archt.

CONTRACTS AWARDED

Ark., El Dorado—ICE PLANT, etc.—Alphin Ice & Storage Co., ice mfg. plant, cold storage plant. Owner builds. **$75,000.**

Ark., Proctor—GIN—Henry Croft, Jr., Proctor, steel, concrete gin. Owner builds. **$40,000.**

Calif., Alameda—COMPRESSOR PLANT—General Eng. & Drydock Co., foot of Schiller St., compressor plant, to Christensen and Lyons, 3454 Harlan St., Oakland. **$40,000.**

Calif., Berkeley—WAREHOUSE—Linde Air Products, 1150 8 St., warehouse, to Fluda Corp., 2500 S. Atlantic St., Los Angeles. Approx. **$40,000.**

Calif., San Francisco—PLANT—Consolidated Milling Co., 151 Bayshore Blvd., plant addns., own forces. **$45,000.**

Calif., San Francisco—PLANT—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., 2 story, bsmnt., irregular sized, rein.-con. combination bldg., separate contracts. **$400,000.** A. F. Roller, Crocker 1st Natl. Bldg., archt. CD 10/17.

Calif., San Jose—WAREHOUSE— Pacific Brewing & Malting Co., 1025 Cinnabar St., 1 story, rein.-con. warehouse, to Cahill Bros., 206 Sansome St., San Francisco. **$45,800.**

Conn., East Killingly — FACTORY — Acme Cotton Products Co., Inc., 245-5 Ave., New York, 4 story, 40x40x ft. and 2 story 40x150 ft. brick factory addns., to Medbury & Trowbridge, 289 Main St., Putnam. Est. **$40,000.**

Conn., East Port Chester—WAREHOUSE—Life Savers, Inc., G. W. Posthill, mgr., N. Main St., Port Chester, N. Y., 1 story, bsmnt., 95x220 ft., brick, warehouse, to Mertz Co., 145 Horton Ave., Port Chester, N. Y. Est. **$75,000.** Bids 10/9. CD 10/7—ENR 10/9.

Conn., Fairfield—FACTORY—Rolock, Inc., Station St., Southport, R. P. Wells, pres., 1 story, 100x100 ft., 2 story, 24x40 ft., brick, steel factory, Kings Hy. and Kings Hy. exten., to Burr Barry, Fairfield, **$56,000.** Est. $40,000. Lyons & Mather, 211 State St., Bridgeport, archts. CD 7/15—ENR 7/17.

Conn., Waterbury—FREIGHT TERMINAL, etc.—Coordinated Terminals, Inc., c/o L. F. Caproni, 1221 Chapel St., New Haven, brick, steel, concrete freight terminal and garage, East Aurora St., to F. P. Sullivan, Inc., 110 Tyler St., East Haven. Est. **$40,000.** CD 9/4—ENR 9/11.

PUBLIC BLDGS. (Low Bidders, Cont'd.)

†**N. J., Cape May**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., Oct. 8, altering Bldgs. 129 and 133, Naval Air Station, from George H. Evans & Co., 1126 Fairmount Ave., Phila., Pa., Items (1) **$58,910**, (2) **$6,905**. CD 10/2.

★**N. Y., Suffern**—Bd. Educ. Central School Dist., Suffern, Oct. 14, Junior and Senior high school, Ramapo Twp., from Fred J. Brotherton, Inc., 200 Main St., Hackensack, N. J., **$528,244**. CD 9/29—ENR 10/2.

N. C., Fayetteville—Fayetteville Housing Auth., Oct. 15, two 56 unit housing, Projects NC 9-1 and NC 9-2, from McDevitt & Street, Charlotte, **$252,980**; plumbing, from J. L. Powers, Bennettsville, S. C., **$47,000**. CD 8/28—ENR 9/4.

O., Columbus—Bd. Trustee Ohio State University, C. E. Steeb, secy., Oct. 10, general contract 3 story, 90x210 ft., brick, steel agriculture laboratory bldg., from Norton & Nadalin, 45 S. Sixth St., **$309,400**. CD 9/24—ENR 10/2.

†**O., Dayton**—U. S. Eng., Wright Field, Sept. 30, rein-con., brick, steel aircraft laboratory and test bldg., plain fdn., from Frank Messer & Sons, Inc., 2515 Burnet St., Cincinnati, **$325,951**. CD 9/26.

†**Pa., Aliquippa** — Beaver County Housing Auth., R. Bennett, chn., Court House, Beaver, Oct. 10, 50 defense housing units, Project 36057X, for USHA, from J. W. Ryan Constr. Co., Inc., 369 Lexington Ave., New York, N. Y. **$241,800**. CD 9/2—ENR 9/4.

Tex., Winters—T. A. Smith, mayor, Oct. 23, Sect. B, generating units, from Fairbanks-Morse Co., 1713 N. Market St., Dallas, **$93,726** ***Sect. A, power plant bldg., from Ross Constr. Co., Box 222, San Angelo, **$25,563*** Sect. C, overhead electric distr. sys., from Walco Eng. & Constr. Co., 2408 E. 4 Pl., Tulsa, Okla., **$69,123**. CD 9/30—ENR 10/2.

†**Va., Dublin**—Farm Security Admin., 227 E. Adenton St., Raleigh, N. C., Oct. 13, 8 dormitories and utilities serving 12 dormitories, from Barger Bros., Mooreville, N. C., **$166,484**. CD 10/9.

CONTRACTS AWARDED

★†**Ala., Gadsden**—Republic Steel Corp., C. A. Thayer, Ch. Engr., Republic Bldg., Cleveland, O., 800 ton blast furnace and battery coke ovens, to Rust Eng. Co., Martin Bldg., Birmingham. Est. **$10,000,000**. Defense Plant Corp. will finance. CD 10/10—ENR 10/16.

Calif., Exeter—Exeter High School Dist., Trustees, high school addns., to L. H. Hansen & Sons, P. O. Box 1784, Fresno. **$161,715**. Bids 10/6. CD 9/16—ENR 9/18.

★**Calif., Los Angeles**—Dpt. Water & Power, 207 S. Bway., water tunnels for harbor steam plant, Wilmington, to American Concrete & Steel Pipe Co., 4635 Firestone Blvd., Southgate, **$618,750**; Bids 10/13, CD 10/15—ENR 9/25, under WW; intake and discharge structure and wharves for same, to Elliott Stroud-Seabrook, 112 W. 9 St., **$528,092**.

★**Calif., Los Angeles**—Housing Auth., 1031 S. Bway., general contract 285 unit Rancho San Pedro housing, Project Calif. 4-4, to Aetna Const. Co., 641 S. Witmer St., **$988,663*** plumbing and heating, to Howe Bros., 1198 S. San Pedro St., **$164,750**. Bids 8/19, awarded 10/17. CD 8/21—ENR 8/28, under LB.

Calif., Oakland—Oakland High School Dist., 1 story, wood frame Montclair School, to W. G. Thornally, 2059 Webster St. **$151,835**. C. A. Whitton 2 Ave. and 10 St., engr.

†**Fla., Fort Barrancas** — Con. Q.M., radio shelter, 3 ordnance warehouses, repair shop, administration bldg., to F. L. Bray, Battle House Hotel, Mobile, Ala. **$151,479**.

†**Ga., Fort Benning**—Con. Q.M., parachute bldg., to Williams Lumber Co., 1038-13 St., Columbus, **$184,145**.

†**Ga., Hinesville** — Farm Security Admin., Montgomery, Ala., farm security project, to Southeastern Mfg. Co., Tuscaloosa, Ala. **$207,520**. Bids 7/14. CD 7/1.

†**Ga., Macon**—Con. Q.M., Camp Wheeler, 3 recreation bldgs., to A. R. Abrams, Commercial Exch. Bldg., Atlanta, about **$160,000**. CD 10/9—ENR 10/16.

Ill., Dupo—Dupo Community High School Dist. 195, of St. Clair Co., c/o Bd. Educ., 2 story, bsmnt., mezzanine, 127x234 ft. and 39x110 ft., brick, rein.-con. high school, to F. Ganschinietz, 501 N. 18 St., East St. Louis, **$152,518**; heating and plumbing, to R. Metzger, 1206 State St., East St. Louis, **$65,498**. Bids 9/30. CD 9/26.

★†**Ill., Great Lakes**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., D. C., hospital corps training school, to The George Sollitt Constr. Co., 109 N. Dearborn St., Chicago. **$500,000**.

†**Ill., Savanna**—Con. Q.M., laundry bldg., bldg. for housing stand-by unit and ramp enclosures for bomb plant, Savanna Ordnance Depot, to Hagstrom Constr. Co., 490 Snelling Ave. N., St. Paul, Minn., **$60,098**.

Ind., West Lafayette (br. Lafayette)—Purdue University, Lafayette, 2 story, 128x140 ft. Wesley Foundation Bldg., to K. H. Kettlehut, 432 Wood St., Lafayette. Est. **$200,000**. E. F. Jansson, 740 Rush St., Chicago, Ill., archt.

★†**Ia., Burlington**—Pub. Bldgs. Admin., 7 and D Sts. S.W., Wash., D. C., 200 dwelling units for ordnance plant, Project 13014 X, to Lovering Constr. Co., 389-3 Ave., St. Paul, Minn. **$733,678**. CD 7/10—ENR 7/17.

†**Mass., Springfield**—American Bosch Corp., 3664 Main St., 1 story, bsmnt., 150x700 ft., brick, steel, rein-con. factory, for Navy Dpt., to Brown & Matthews, Inc., 122 E. 42 St., New York, N. Y. Est. **$300,000**. Bids 8/29. Defense Plant Corp. will finance. CD 8/25.

†**Mass., Springfield**—Con. Q.M., Springfield Armory, 60x180 ft., brick, stone field service unit addn., Pearl and Federal Sts., to Casper Ranger Constr. Co., 6 Newton St., Holyoke, Est. **$125,000**. McClintock & Craig, 458 Bridge St., engrs.

Mich., Travers City—Furnishing, erecting turbine generator unit in power house, to Elliott Co., Jeannette, Pa. **$67,316**; surface condenser, to C. H. Wheeler Mfg. Co., 19 St. and Lehigh Ave., Phila., Pa., **$22,350**. CD 9/10—ENR 9/18.

†**N. J., East Paterson**—Wright Aeronautical Corp., 132 Beckwith Ave., Paterson, 1 story, brick, steel oil storage bldg., River Rd., for War Dpt., to Mahoney Troast Constr. Co., 657 Main Ave., Passaic. Defense funds involved.

★†**N. Y., Massena**—Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa., foundations for 66 bldgs. for manufacturing aluminum, to P. J. Carlin Constr. Co., 101 Park Ave., New York, N. Y. Est. **$1,000,000**. Defense Plant Corp. will finance. Bids 10/1. CD 8/25—ENR 8/28.

★**N. Y., New York**—Dpt. P. Wks., Municipal Bldg., exten. William Hallock Park Biological bldg. $1,000,000.

†**N. C., Camp Davis**—Con. Q.M., 2 motor repair shops, oil house, grease-wash rack, to F. N. Thompson, 145 Brevard St., Charlotte, **$86,400**. Bids 10/7. CD 9/20—ENR 10/2.

†**N. C., Wilmington**—Con. Q.M., 494 Spring St. N.W., Atlanta, Ga., 4 USO recreation bldgs., to A. R. Abrams, Commercial Exchange Bldg., Atlanta, Ga. About **$190,000**. CD 9/3—ENR 9/11.

★†**Pa., Clairton**—Div. Defense Housing, FWA, 18 and F Sts. N.W., Wash., D. C., 138 defense housing units, Project 36152X, to Dick Constr. Co., 2532 Library Rd., Pittsburgh, **$1,260,000**. CD 10/9—ENR 10/16.

★†**Pa., West Mayfield**—Beaver County Housing Auth., R. Bennett chn., 119-9 St., Monaca, 170 defense housing units, Project 36054X, for USHA, to J. O. Burgwin, Professional Bldg., Pittsburgh, **$755,700**. CD 10/9—ENR 10/16.

S. C., Aiken—Housing Auth., Valley Homes, Proj. SC 7-3, to Townsend Lumber Co., Anderson, **$287,327**; Stoney Homes, Proj. SC 7-2, to Hardin & Ramsey, 161 Spring St., Atlanta, Ga., **$121,882**. CD 9/23—ENR 9/25.

★**Tex., Dallas**—Dallas Housing Auth., 2525 Lucas Dr., Cedar Springs housing, 220 units, Tex. 9-3, USHA, to Will O'Connell, Austin, **$778,565**. Bids 9/22. CD 9/26—10/2, under LB.

Tex., Lufkin—Angelina Co., c/o Judge, Lufkin, 2 to 3 story, part bsmnt., brick, rein.-con. hospital, **WPA, $210,000**. CD 6/30—ENR 7/3.

†**Wis., Milwaukee**—Globe-Union, Inc., 900 E. Keefe Ave., general contract steel, brick ware-

inald and G. D. Boa[illegible]on, 56 Ames [illegible] concrete, brick, steel [illegible]ness bldg., 4 bury St. Over $150,00[illegible]

Mass., Worcester—M[illegible]ital Hospital Belmont St., soon lets [illegible]ntract, brick stone hospital, Belmont [illegible] $155,000 Curtin, Mason & Riley, [illegible] Newbury St., B archts. G. Adolph Johns[illegible] 396 Main St. ton, assoc. archt. CD [illegible]—ENR 1/27

N. J., West Orange—[illegible] Essex Co. Club, Hutton Park, soon [illegible]lets contract story, bsmnt., 68x212 ft. [illegible]overall, brick country club house, Prospect Ave. [illegible] Hunter McDonnell, 101 Park Ave., New archt.

★**N. Y., New York**—One Thousand Hundred and Eleven 5 Ave., Inc Kaufman, pres., 18 E. 48 St., plans by Roth & Sons, 18 E. 48 St., 18 story and house, 100x177 ft. apartment, 1109-1113 $800,000.

N. Y., New York—Three Hundred Wenty-Second St. Constr. Co., Inc., 3 Cortland Ave., plans by H. H. Lillien E. 149 St., 6 story, 61x90 ft. apartment West End Ave. $150,000.

N. Y., New York—J. S. Wickler, 1351 cobel Ave., plans by H. Lillien, 215 E. 14 6 story, 85x100 ft. apartment, 51 W. $160,000.

N. Y., New York—J. Wickler, 1351 Bo Ave., plans by H. H. Lillien, 215 E. 14 6 story, 84x175 ft. apartment, Anthony near Burnside Ave. $250,000.

O., Berea—Bd. Trustees Baldwin-W College, L. C. Wright, pres., physical [illegible] tion bldg. $150,000.

O., Cleveland—Workmen's Housing C c/o W. F. Bennett, Jr., pres. (and ar 2341 Carnegie Ave., 100 homes, Brookpark Biddulph Rds. $450,000.

S. C., Greenville—M. C. Davenport, Fo lin Natl. Life Bldg., 48 unit apartment 000.

Tex., Houston—C. E. King, Esperson B 50 brick veneer, asbestos siding, [illegible] dwellings $250,000.

BIDS ASKED

Bids Asked About November 10

Ill., Maywood—Paramount Pictures, 1306 S. Michigan Ave., Chicago, theat Ave. and Warren St. $250,000. Rapp & R 230 N. Michigan Ave., Chicago, archts 9/10—ENR 9/18.

CONTRACTS AWARDED

Ark., Ft. Smith—R. N. Donoho, 50 dences, to C. L. Durbin & Wendell Joh Ft. Smith. **$150,000**.

Ark., Ft. Smith—Flocks Constr. Co. residences. Owner builds. **$150,000**.

Conn., Bridgeport — Sound View Vil Inc., Sylvan Ave., 100 frame homes, 35 site, Ehrsam Farm, to City Constr. Co. van Ave. Est. **$450,000**.

Conn., Hamden—Gilbert Homes, Inc., Whitney Ave., 50 frame homes, Valley Rd.

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COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

N. Y., Brooklyn—J. H. Bldg. Corp., 80 Lefferts Ave., 6 story, 120x122 ft. apartment, 2002 Ocean Ave., separate contracts. **$250,000.** Seelig & Finkelstein, 153 Pierrepont St., archts. CD 10/3—ENR 10/9.

N. Y., New York—Two Hundred and Forty-five East Thirty-Seventh Street, Inc., 2015 Foster Ave., Brooklyn, 6 story, 80x108 ft. apartment, 685 2 Ave., separate contracts. **$160,000.** W. T. McCarthy, 44 Court St., Brooklyn, archt. CD 10/3—ENR 10/9.

N. Y., New York—Valcourt Realty Corp., 998 Bway., 6 story, 90x92 ft. apartment, 223 E. 61 St., separate contracts. **$200,000.** J. M. Nelson, 250 W. 57 St., archt. CD 10/9—ENR 10/16.

Pa., Pittsburgh—Kirwel Co., c/o L. Wells and J. Heselbarth, 506 S. Main St., general contract 50 residences, Kennedy Twp., near Store, to C. E. Hudson, 134 Singer Ave., McKees Rocks. Est. **$150,000.**

Pa., York—C. MacDonald, c/o Southern Theatre, York, Mayfair theatre and store, N. George St., separate contracts. **$150,000.** CD 10/14—ENR 10/16.

Tex., Houston—Houston Ready-Cut House Co., 3601 Polk St., 30 dwellings, Crane St. and Woods. Owner builds. **$150,000.**

Alta., Lethbridge—Church of Latter Day Saints, Sherlock Bldg., church and hall, day labor. **$150,000.** Architect, c/o Dr. Spackman, Sherlock Bldg., Lethbridge. CD 3/6—ENR 3/13.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Berkeley—PLANT—Durkee Famous Foods, 2900 Fifth St., plant expansion. $40,000 or more.

★**Calif., Buttonwillow**—GENERATING FACILITIES—Pacific Gas & Electric Co., 245 Market St., San Francisco, generating facilities at Midway Steam Plant. $6,850,000.

Calif., Oakland—PLANT—G. R. Borrmann Steel Co., 25 8 St., plant expansion. $45,000.

Calif., Oakland — WAREHOUSE — Consolidated Freightways, 1700 24 St., completing plans by A. Froberg, 3454 Harlan St., 1 story, rein.-con. warehouse. $40,000. CD 1/22—ENR 1/30.

Calif., Oakland — WAREHOUSE — Jackson Furniture Co., Clay St. between 13 and 14 Sts., warehouse addns. $40,000.

Calif., Oakland—TRUCK TERMINAL—Merchants Express Corp., Ferry and Freight Sts., plans by Miller & Warnecke, Financial Center Bldg. $40,000.

Calif., Oakland—FACTORY—Romak Iron Wks., 915-13 St., factory. $40,000.

Calif., San Francisco — PLANT — Seven-up Bottling Wks., San Bruno Ave. and Hilton St., bottling plant addn. $40,000.

N. J., Newark—PLANT—Purolator Products, Inc., 365 Frelinghuysen Ave., rejected bids Oct. 10, 1 story, 100x155 ft., brick, concrete oil filter factory top addn. W. Newmann & Sons, 587 Summit Ave., Jersey City, archt. CD 10/7—ENR 10/9.

N. J., Perth Amboy—WAREHOUSE—Green-Span Bros. Co., 369 Herbett St., soon lets contract, 1 story, brick, steel grocery warehouse. The Ballinger Co., 105 S. 12 St., Phila., Pa., archt. and engr.

N. Y., Long Island City — FACTORY—Liquidometer Corp., 36-16 Skillman Ave., plans by C. M. Lobejager, 54-19 Roosevelt Ave., Woodside, 2 story factory, 41-95 36 St. $50,000.

O., Athens—POWER HOUSE, etc.—N. Y. Coal Co., P. C. Morris, genl. mgr., Athens, new power house, tipple, Coal Mine 25, to replace units, destroyed by fire. $50,000.

O., Cleveland—FACTORY—Cleveland Wire Spring Co., J. W. Campbell, pres.-treas., E. 49 St. and Harvard Ave., brick, steel, concrete factory. $75,000.

O., Cleveland—FACTORY—Columbia Electric Mfg. Co., A. Friedman, pres., 4519 Hamilton Ave., plans by Christian, Schwarzenberg & Gaede, 1836 Euclid Ave., brick, steel factory, remodeling 3 story bldg. $125,000.

O., Gallipolis — GENERATING PLANT — Buckeye Rural Electric Co-operative, Inc., J. R. Lusher, supt., Gallipolis, electric generating plant. $250,000 REA allot.

O., Wilmington—FACTORY—S. Frieder & Sons Co., A. Frieder, pres., 246 Main St., Cincinnati, cigar factory. $100,000.

★**Ore., Portland**—WAREHOUSES, etc.—Commercial Iron Wks., W. W. Casey, pres., foot of S. W. Grover St., 2 warehouses, 2 coverede shipways, exten. office bldg., mold loft, outfitting dock, etc. $500,000.

Pa., Bethlehem—GAS PLANT—Allentown-Bethlehem Gas Co., Commonwealth Bldg., Allentown, gas-making plant unit addn., Coke Works Rd. plant. $40,000.

Pa., Erie—BULK PLANT—Socony Vacuum Oil Co., J. R. Taylor, purch. agt., 26 Bway., New York, N. Y., completed plans 2 story, 50x125 ft., brick bulk plant, warehouse, 6 storage tanks, unloading docks, etc., East Lake Rd., $100,000. A. E. Esser, 1500 Walnut St., Phila., company engr. E. M. Harvey, Jr., 1500 Walnut St., Phila., div. engr.

Pa., Jeannette—WAREHOUSE—H. L. Widom, archt., Granit Bldg., Pittsburgh, Pa., soon lets contract, 2 story, bsmnt., 60x122 ft., brick, steel, concrete block furniture warehouse, Magee St., for Frank Levin Furniture Co., F. Levin, chg.

Pa., Pittsburgh—PLANT—S. L. Roush, archt., 1210 Chamber of Commerce Bldg., soon lets contract, 3 story, 100x100 ft., brick, steel plant, addn., for Kerotest Mfg. Co., E. G. Mueller, pres., 2525 Penna Ave. $100,000.

R. I., Phillipsdale—WAREHOUSE, etc.—Bird & Son, Inc., East Walpole, Mass., soon let contract 1 story, 154x360 ft., brick, warehouse and dryer bldg. Over $40,000. Gantenaume & McMullen, 99 Chauncy St., Boston, Mass.,

Ont., Toronto—PLANT—Mathers & Haldenby, archts., 96 Bloor St. W., bids soon, plant exten., for Campbell Soup Co., Ltd., 1 St. $150,000.

Ont., Toronto—PLANT—H. Disston & Son, Ltd., 2 Fraser Ave., rejected bids, plant extension, $40,000. Will readvertise. Shoemaker & Burnham, 45 W. Richmond St., engrs.

Ont., Toronto—PLANT—McCall-Frontenac Oil Co., Ltd., 117 Harbour St., bids soon new blending plant on refinery property, Cherry St. $250,000.

Ont., Toronto—PLANT—W. D. Beath & Son, Ltd., 394 Symington Ave., plans by S. Smith, 25 Melinda St., 2 story, 36x130 ft., rein.-con., brick plant exten., $40,000.

Ont., Toronto—PLANT—Jones Bros. Ltd., 858 Dupont St., paper mfg. plant, $40,000.

Ont., Toronto—PLANT—S. F. Smith, archt., 25 Melinda St., bids soon plant exten., for Standard Ultramarine Co. of Canada, Ltd., 132 St. Helen's Ave. About $60,000.

Que., Chicoutimi—PLANT—Quebec Pulp and Paper Co., Ltd., remodelling plant for munition mfg. $70,000.

Que., Montreal—PLANT—Ross & MacDonald, archts., 1010 St. Catherine St. W., soon lets contract, printing plant addn., 6306 Park Ave., for Ronalds Co. Ltd., 6306 Park Ave. $50,000. CD 9/23—ENR 9/25.

Que., Montreal — PLANT — Johnson Wire Works, Ltd., 4760 Dagenais St., 1 story, 73x318 ft., steel, brick plant addn., concrete fdn. $80,000. J. Pringle & Son, Ltd., 48 S. McGee St., engr.

Que., Three Rivers—PLANT—Canadian International Paper Co., Ltd., Sun Life Bldg., Montreal, pulverizing and coal handling plants. $350,000.

BIDS ASKED

Calif., Torrance—FACTORY—National Supply Co., 1524 Border Ave., steel factory addn. Over $40,000. Taylor & Taylor, 803 W. 3 St., Los Angeles, archt. and engr. CD 9/23—ENR 9/25.

Wis., Eau Claire—GARAGE—Schumacher Motor Express Co., 807 S. Oxford Ave., 1 story, part bsmnt., 55x100 ft., brick, steel garage. H. M. Nelson, 204 E. Grand Ave., archt.

Wis., Sturgeon Bay—WAREHOUSE, etc.—M. W. Miller & Co., 3 story, 40x106 ft., brick, concrete warehouse and cold storage bldg. W. J. Bernhard, Ephraim, archt.

LOW BIDDERS

N. C., Fayetteville—LAUNDRY—Mayflower Co., Oct. 7, laundry addn., imprvs., from Reinecke-Dillehay, Inc., Fayetteville. **$72,500.** B. G. Laslett, Fayetteville, archt.

CONTRACTS AWARDED

Ark., El Dorado—ICE PLANT, etc.—Alphin Ice & Storage Co., ice mfg. plant, cold storage plant. Owner builds. **$75,000.**

Ark., Proctor—GIN—Henry Croft, Jr., Proctor, steel, concrete gin. Owner builds. **$40,000.**

Calif., Alameda—COMPRESSOR PLANT—General Eng. & Drydock Co., foot of Schiller St., compressor plant, to Christensen and Lyons, 3454 Harlan St., Oakland, **$40,000.**

Calif., Berkeley—WAREHOUSE—Linde Air Products, 1150 8 St., warehouse, to Fluda Corp., 2500 S. Atlantic St., Los Angeles. Approx. **$40,000.**

Calif., San Francisco—PLANT—Consolidated Milling Co., 151 Bayshore Blvd., plant addns., own forces. **$45,000.**

Calif., San Francisco—PLANT—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., 2 story, bsmnt., irregular sized, rein-con. combination bldg., separate contracts. **$400,000.** A. F. Roller, Crocker 1st Natl. Bldg., archt. CD 10/17.

Calif., San Jose—WAREHOUSE— Pacific Brewing & Malting Co., 1025 Cinnabar St., 1 story, rein.-con. warehouse, to Cahill Bros., 206 Sansome St., San Francisco, **$45,800.**

Conn., East Killingly — FACTORY — Acme Cotton Products Co., Inc., 245-5 Ave., New York, 4 story, 40x40x ft. and 2 story 40x150 ft. brick factory addns., to Medbury & Trowbridge, 289 Main St., Putnam. Est. **$40,000.**

Conn., East Port Chester—WAREHOUSE—Life Savers, Inc., G. W. Posthill, mgr., N. Main St., Port Chester, N. Y., 1 story, bsmnt., 95x220 ft., brick, warehouse, to Mertz Co., 145 Horton Ave., Port Chester, N. Y. Est. **$75,000.** Bids 10/9. CD 10/7—ENR 10/9.

Conn., Fairfield—FACTORY—Rolock, Inc., Station St., Southport, R. P. Wells, pres., 1 story, 100x100 ft., 2 story, 24x40 ft., brick, steel factory, Kings Hy. and Kings Hy. exten., to Burr Barry, Fairfield, **$56,000.** Est. $40,000. Lyons & Mather, 211 State St., Bridgeport, archts. CD 7/15—ENR 7/17.

Conn., Waterbury—FREIGHT TERMINAL, etc.—Coordinated Terminals, Inc., c/o L. F. Caproni, 1221 Chapel St., New Haven, brick, steel, concrete freight terminal and garage, East Aurora St., to F. P. Sullivan, Inc., 110 Tyler St., East Haven. Est. **$40,000.** CD 9/4—ENR 9/11.

INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Ia., Des Moines—BOILER HOUSE—Marquette Cement Mfg. Co., 140 S. Dearborn St., Chicago, Ill., boiler house, DesMoines plant, to A. H. Neumann & Bros., Inc., 514 Hubbell Bldg., **$60,000**

★**Ia., Waterloo**—PLANT—Rath Packing Co., Waterloo, 3 story, bsmnt., 59x168 ft. beef cooling and shipping bldg., and 1 story, bsmnt., 80x200 ft. killing and processing beef bldg., to W. A. Klinger, Inc., 201 Warnock Bldg., Sioux City. **$800,000.**

Ky., Louisville—BOTTLING PLANT — The Pepsi-Cola Bottling Co., 1104 Bardstown Rd., design and construction 160 ft. wide, 300 ft. deep, brick bottling plant, Algonquin Parkway, to Leslie V. Abbott, 2321 S. Brook St. Est. **$40,000.**

Ky., Louisville—PLANT—Reynolds Metals Co., 311 Bway., plant addn., 4 and Montana St., own forces. **$279,000.**

Md., Baltimore—GARAGE, etc.—Fairfield Western Maryland Dairy, Linden Ave. and Dolphin St., 1 story, 45x60 ft. under block steel, brick garage and office bldg., to W. E. Bickerton Co., 515 Cathedral St., **$40,000.**

Md., Baltimore — WAREHOUSE — Scully Steel Prod. Co., 1600 Bush St., 1 story, 50x120 ft. steel, concrete warehouse, to H. J. Dudley, 102 W. Chase St., **$40,000.**

Mass., Baldwinsville — PLANT — Thompson Chair Corp., Maple St., Gardner, 1 story, 55x185 ft., brick plant, to Columbus & Berg, 177 Elm St., Gardner. Est. **$45,000.**

Mass., Framingham — PLANT — Hodgman Rubber Co., Herbert St., 1 story 103x120 ft. churn compound plant addn., to Olivia Bros., 410 Union Ave. Est. **$40,000.** CD 9/17—ENR 9/25.

Mass., Springfield—PLANT—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., 1 story, 120x300 ft., brick, steel manufacturing bldg., East Springfield, separate contracts. **$60,000.** CD 10/17.

Mo., St. Louis—STORAGE—M. German, 7301 Stanford Ave., 1 story, 60x110 ft., brick, concrete, storage addn., 2836 Aldine Pl. to Jacob Rubin & Sons, 602 Wainwright Bldg. Est. **$40,000** with equip. S. L. Rubin, 601 Wainwright Bldg., archt.

Mo., St. Louis—TRUCK TERMINAL—M. J. Wolken, 2844 Penn St., 1 story, 46x175 ft., brick truck terminal, concrete fdn., to H. A. Henske, 4497 Pershing Ave. Est. **$40,000** with equip. E. J. Gieseler, 4398B Gibson Ave., archt.

Mo., St. Louis—WAREHOUSE—J. E. Williams, 7483 Stanford St., University City, 2 story, 110x145 ft. brick, warehouse, concrete fdn., 5200 N. Second St., to J. E. Williams Constr. Co., 6914 Dartmouth Ave. Est. approx. **$50,000.** O. W. Stiegemeyer, 4412 Lindell Blvd., archt.

Mo., Springfield—WAREHOUSE—Producers Produce Co., general contract warehouse, to L. H. Britton, 2195 N. Bway. Est. **$50,000.** E. Hawkins, McDaniel Bldg., archt.

N. J., Bloomfield—PLANT — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., design and construction 5 manufacturing bldgs. and bridge between 2 bldgs., to Salmond Scrimshaw Constr. Co., 58 Elm St., Arlington. Est. **$55,000.**

N. J., Kearny—TRAIN SHED, etc.—Western Electric Co., Inc., 100 Central Ave., 1 story, 25x300 ft., brick, steel train shed, with track, 1 story, 75x75 ft., frame, corrugated iron test bldg., 1 story, 10x25 ft. watchmen's shelter exten., Central Ave., to Skinner, Cook & Babcock, 60 E. 42 St., New York. **$80,991.** C. T. Siebs, c/o owner, engr.

N. J., Newark—FACTORY—Lapin Products Co., Inc., 136 Techenor St., extensive general interior alterations manufacturing bldg., Delancy St., to Strauss Constr. Co., 60 Park Pl. **$50,000.** J. F. Cook, 9 Clinton St., archt.

N. J., New Brunswick — WAREHOUSE — E. H. Halloway, 43 French St., 1 and 2 story, bsmnt., 52x100 ft., brick, hollow tile, electrical supplies warehouse, Somerset St., separate contracts. A. Merchant & Son, 1 Elm Row, New Brunswick, archts.

N. J., North Bergen—WAREHOUSE—The Bushell Co., 201 10 St., Jersey City, 1 story, 40x60 ft., concrete block, brick machinery warehouse, 1 story, concrete block machine shop, Tonnelle Ave., day labor. W. C. Pattison, 133 Van Houten Ave., Passaic, archt.

N. J., North Bergen — FACTORY — U. S. Rubber Co., 1435 51 St., 2 one story, 100x150 ft. and 100x200 ft., brick, steel rubber goods factory addns., to W. J. Lange, Inc., 1617 51 St. **$175,000.** E. M. Rogold, 1617 51 St., engr.

N. J., Ridgefield—FACTORY—Amsco Wire Products, Inc., 606 Grand Ave., design and construction 1 story, brick, steel wire factory addn., Grand Ave., to Bonanno Constr. Co., Inc., 8533 Tonnelle Ave., North Bergen.

N. J., Union—MOTOR LODGE—Garden State Motor Lodge, 1819 Bway., New York, N. Y., three 1 story, 20x65 ft. brick, frame motor lodge bldgs, Route 29, separate contracts. **$40,000.** W. Mayer, Jr., 5801 Berganline Ave., West New York, archt.

N. Y., Brooklyn—COMPRESSOR HOUSE, etc.—Robins Drydock & Repair Co., 1-75 Beard St., 2 story, 45x113 ft. compressor house and transformer station, 2-46 Halleck St., to Irons & Reynolds, 420 Lexington Ave., New York. Est. **$95,000.** Bids 10/15. CD 10/14—ENR 10/16.

N. Y., Brooklyn—FACTORY—J. Munt, 2 Columbus Circle, New York, 1 story, 100x150 ft. factory, 54 N. 11 St., separate contracts. **$40,000.** C. N. & S. Whinston, 2 Columbus Circle, New York, archts. CD 10/10—ENR 10/16.

N. Y., Falconer — FOUNDRY — Jamestown Malleable Iron Corp., Tiffany Ave., Jamestown, 1 story, brick, steel, concrete glass foundry addn. 3, to Warren Constr. Co., 335 Steele St., Jamestown. Est. **$40,000.**

O., Mansfield—ENAMELING—Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., 1 story, 100x300 ft. timber superstructure enameling bldg., separate contracts. **$95,000.**

O., Marion—REPEATER—Ohio Bell Telephone Co., 750 Huron Rd., Cleveland, repeater bldg., near here, to Bitler Bros. Constr. Co., 322 McPheron St., Lima, **$47,000.**

O., Springfield—TESTING LABORATORY—National Supply Co., 1401 Sheridan Ave., research and testing laboratory and factory bldg., to The T. A. Thompson Constr. Co., Chicago, Ill., approx. **$182,000.** CD 6/19—ENR 6/26.

O., Warren—FACTORY—American Welding & Mfg. Co., Warren, 1 story, 173x262 ft., brick, steel factory, to Brown Constr. Co., 1900 Euclid Bldg., Cleveland. Est. **$125,000.** A. Rowe, 1900 Euclid Bldg., Cleveland, engr. CD 10/14—ENR 10/16.

Ore., Portland—PLANT—Electro-Metallurgical Co., subsidiary Union Carbide & Carbon Corp., 30 E. 42 St., New York, N. Y., skeleton of 190x280 ft., steel, brick main bldg., office bldg., and pack and furnace unit, 55 ft. high, to L. H. Hoffman Constr. Co., 715 S. W. Columbia St., Portland, Est. **$250,000.** Awarded 10/11. G. L. Lardie, Niagara Falls, N. Y., company engr. CD 3/26—ENR 4/3.

Pa., East Pittsburgh — LABORATORY — Westinghouse Electric & Mfg. Co., East Pittsburgh, 2 story, 37x105 ft. rein.-con. research laboratory addn., separate contracts. **$55,000.**

Pa., Erie—PLANT—Swanson Tool & Mache. Co., 810 E. 8 St., 1 story, 51x108 ft., brick, steel, concrete plant addn., separate contracts. **$40,000.**

Pa., Exeter (Pittston P.O.)—WAREHOUSE, etc.—Socony Vacuum Oil Co., Inc., 230 Park Ave., New York, N. Y., warehouse, combination garage and office, bulk distr. and storage station, etc., 4 acre site, Black Rd., to Sordoni Constr. Co., Forty Fort. Est. **$60,000.**

Pa., Homewood (sta., Pittsburgh)—PLANT—Westinghouse Electric & Mfg. Co., Union Bank Bldg., East Pittsburgh, two 1 story, brick, steel manufacturing bldg. addns., rein.-con loading platform, separate contracts. **$40,000.** CD 10/17.

Pa., Munhall—PLANT—Ammerman Cleaning Co., D. H. Ammerman, pres., 232 2 Ave., Homestead, 1½ story, 102x142 ft., brick, tile, steel cleaning plant, to Morgan & Co., W. 8 Ave., Homestead, Pa. A. Wickerham, 135 E. 8 Ave., Homestead, archt.

Pa., Pittsburgh — WAREHOUSE, etc. — Francis T. Leggett & Co., F. T. Gregory, mgr., 1213 Galveston Ave. and Bowater St., 1 story, 100x224 ft., rein.-con., brick warehouse exten., to Rose & Fisher, 3216 McClure Ave. N.S. Est. **$40,000.** J. F. McWilliams, Negley Bldg., archt. CD 9/15—ENR 9/18.

★**Pa., Sharon**—TANK SHOP, etc.—Westinghouse Electric & Mfg. Co., East Pittsburgh, 160x1125 ft., rein.-con. tank shop, **$550,000** Westinghouse Electric & Mfg. Co., Union Bank Bldg., Pittsburgh, Roberts & Schaffer, 2017 S. St., and Connecticut Ave., Wash, D. C., structural engr.; 5 story, bsmt., 60x140 ft., rein.-con. office bldg., addn., **$175,000,** separate contracts. CD 9/10—ENR 9/18.

Pa., Williamsport—WAREHOUSE — Lowry Electrical Co., Inc., 643 Elmira St., 1 story, brick, steel, concrete warehouse and distr. bldg., separate contracts. **$40,000.** CD 10/8—ENR 10/16.

S. D., Belle Fourche—WAREHOUSE—M. Schuft, Belle Fourche, 116x210 ft. concrete, stucco warehouse, to Verm Wilson, Belle Fourche. Est. **$40,000.**

Tenn., Gowan — STORAGE FACILITIES—Cumberland Portland Cement Co., design and construction storage facilities, 4 concrete silos, to Rust Eng. Co., Martin Bldg., Birmingham, Ala. Est. **$50,000.**

Tex., Amarillo—WAREHOUSE—Consumers Co-op Assn., 107 Filmore St., 1 story, 60x180 ft. brick, concrete, steel warehouse, to Randall Constr. Co., 529 Amarillo Bldg., **$40,000.** A. R. Randall, 529 Amarillo Bldg., engr.

Tex., Denison — REPAIR SHOP — Missouri-Kansas-Texas Ry. Co., Railway Exch. Bldg., St. Louis, Mo., F. Ringer, ch. engr., expansion railway car repair shops, etc., force account. **$125,000.**

★**Tex., Fort Arthur**—PLANT—Texas Steel Mfg. Co., c/o A. J. Armstrong, vice pres., 3901 Hemphill St., Fort Worth, steel and concrete production plant for manufacturing shell cases and shell forgings, to H. E. Beyster Corp., 3901 Hemphill St., Fort Worth and Detroit, Mich. **$1,260** [illegible] Additional CD 8/13—ENR 8/24, under A.

Tex., Waco—GLASS FACTORY—Owens-Illinois Glass Co., Ohio [illegible], Toledo, Petroleum Tower, Dallas, [illegible] mfg. plant, acre site, outside city limits, to Ingo Co. Co. Inc., 2326 N. Beckley [illegible] Dallas, appr. **$480,000.**

Utah, Ogden—ROUNDHOUSE—Union Pacific R. R., H. B. Parter, ch. engr., 1416 Dodge St., Omaha, Neb., brick roundhouse, to Jas. Leck Co., 211 S. 11 St., Minneapolis, Minn. Est. **$70,000.** CD 9/23—ENR 9/25.

Vt., Lyndonville—FACTORY—Vermont Tap & Die Co., 2 story, bsmnt., 50x160 ft., reinforced con., timber mfg. plant, [illegible] Harty Bldg., Constr. Co., 25 Huntington Ave., Boston, Mass., approx. **$50,000** cost-plus-fixed-fee-basis. CD 10/14—ENR 10/16.

Wis., Ellsworth — CREAMERY — Ellsworth Co-op. Creamery Co., general contract, 1 story, part bsmnt., 41x122 ft., steel, concrete creamery, to R. W. Scott, Albert Lea, Minn., [illegible] ing, plumbing, to E. Kobersteen, Ellsworth, electrical work to E. Erickson, Ellsworth, Klinger & Hubbard, 218 S. Barstow St., Eau Claire, archts. CD 7/23—ENR 7/31.

Wis., Manitowoc—GARAGE — Fritsch-Nash Garage, 1 story, 50x110 ft., brick, steel garage addn., concrete fdn., to Kasper Constr. Co., 1203 W. 16 St.

Wis., Port Washington—FACTORY—Bolens Prod. Co., Park Ave., 1 story, 86x148 ft., 74x96 ft. concrete brick factory addn., concrete and reinforcing steel contract, Ubbink Coal & Dock Co. • • • lumber, Pantzer Lumber Co. • • • carpentry and concrete labor, to T. E. Gahan • • • steam heating and plumbing, to J. A. King, all foreman of Port Washington • • • masonry labor, Endlich Constr. Co., 1827 N. 30 St., Milwaukee.

Wis., West Allis — FACTORY — Universal Unit Power Shovel Corp., 6401 W. Becker St., 1 story, 75x200 ft., steel, brick factory addn., to Klug & Smith Constr. Co., 111 E. Wisconsin Ave., Milwaukee.

Ont., Brantford—PLANT—Frack & Frack archts., Pigott Bldg., Hamilton, plant addn., Canal Rd., for Canadian Durex Abrasives Ltd., to Cromer Constr. Co. Ltd., 448 Colborne St. About **$300,000.** CD 10/17—ENR 8/21.

Ont., Exeter — PLANT — Canadian Canners Ltd., Aylmer, plant exten., day labor. **$40,000**

Ont., Hamilton—PLANT—Aerovox Canada Ltd., Barton St., 30x200 ft., steel, clay tile plant, to Pigott Constr. Co., Ltd., Pigott Bldg., about **$50,000.** Hutton & Souter, Pigott Bldg., archt. CD 9/4—ENR 9/11.

Ont., Hamilton—PLANT—Dominion Foundries & Steel, Ltd., Depew St., armour plate bldg. addn., to Canadian Eng. & Contg. Co. Ltd., 25 Hughes St. S., about **$60,000.** CD 8/2—ENR 8/8.

Ont., Long Branch—PLANT—Neptune Meters Ltd., 345 Sorauren Ave., Toronto, 1 story, 90x250 ft., brick, structural steel plant exten., concrete fdn., to Ramsay Contg. Co., Ltd., 39 Indian Rd., Toronto. Est. **$125,000.** Pringle & Son Ltd., 36 Toronto St., Toronto, engrs.

Ont., Oshawa — ENGINEERING — General Motors of Canada, Ltd., Oshawa, engineering bldg., to W. B. Sullivan Constr. Co., Ltd., 30 Bloor St. W., Toronto. About **$100,000** Allward & Gouinlock, 57 Bloor St. W., Toronto, archts. CD 8/21—ENR 8/28.

Ont., Sault Ste. Marie—POWER PLANT—Great Lakes Power Co. Ltd., 7 Queens St. E., power plant, day labor. **$50,000.**

Ont., Toronto — PLANT — Neptune Meters Ltd., 345 Sorannsen Ave., plant, Lake Shore Rd., Long Branch, to Ramsay Contg. Co. Ltd., 39 Indian Rd., Crescent. **$125,000.** Pringle & Son, Ltd., 36 Toronto St., engr.

Que., Hull—PLANT—E. B. Eddy Co., Ltd., 7 Bridge St., remodelling plant, to Foundation Co. of Canada, Ltd., 1538 W. Sherbrooke St., Montreal, Que. Est. **$175,000.**

Que., Montreal—MACHINE SHOP—Energy Works, Inc., 318 Ann St., 1 story, 35x100 ft. and 2 story 28x70 ft., conc., steel, brick machine shop exten., to Sutherland Constr. Co. Ltd., 1440 W. Ste. Catherine St. Est. **$40,000** CD 9/8—ENR 9/18.

Que., Montreal—PLANT—Railway & Power Eng. Corp., Ltd., 3745 St. James St. W., plant addn., St. James St. W., and Irene St. to J. W. Ross, 1070 Ste. Catherine St. W., about **$40,000.**

Que., Sherbrooke — FOUNDRY — Canadian Ingersoll-Rand Co. Ltd., Commissioner St., 1 story, 78x100 ft., structural steel, brick foundry exten., Des Forges St., day labor **$65,000.** H. G. James, 36 Portland Ave., archt.

Que., Ville St. Pierre—PLANT—Canadian Car & Fdry. Co. Ltd., 621 Craig St. W., Montreal, plant exten., to Corinthian Constr. Co. Ltd., 5726 W. Sherbrooke St., Montreal Est. **$40,000.** Spence, Mathias & Burge, 2465 Union Ave., Montreal, archts.

Sask., Moose Jaw—PLANT—Prairie Airways Ltd., Airport, Moose Jaw, aircraft plant, to Carter-Hall-Aldinger, Ltd., 400 Royal Bank Bldg., Winnipeg, Man. Est. **$250,000.** Dept. Munitions & Supply, Ottawa, Ont., engr.

OFFICIAL PROPOSALS

Official notices of bids wanted on construction and related work, equipment and material for government, state, municipal departments and private enterprises

RATE: THE RATE FOR OFFICIAL PROPOSAL ADVERTISING IS 50 CENTS PER LINE (OR FRACTION) PER INSERTION COPY RECEIVED UP TO 12 NOON TUESDAY FOR ISSUE OUT THURSDAY SUBJECT TO SPACE OPEN FOR LAST-MINUTE ADS SEND COPY TO OFFICIAL PROPOSAL DIVISION, ENGINEERING NEWS-RECORD, 330 W. 42ND ST., NEW YORK, N. Y.

Bids: November 25 (613)

Sewage Treatment Plant and Garbage Incinerator

OUTFALL SEWERS
CITY OF STAMFORD, CONN.

Sealed bids for the construction of Outfall Sewers, Sewage Treatment Plant and Garbage Incinerator for the City of Stamford, Connecticut, will be received at the office of the Commissioner of Finance, Room 31, Town Hall Building, Stamford, Connecticut, until 2 P. M. (Eastern Standard Time) on the 25th day of November, 1941, and then at said office publicly opened and read aloud.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications and Form of Performance Bond may be examined at the office of the City Engineer, Stamford, Conn., and at the office of Solomon & Keis, Consulting Engineers, 257 Broadway, Troy, N. Y., copies thereof may be obtained at the said offices of the City Engineer, or Solomon & Keis, upon payment of $25.00 for each set. Any bidder upon returning such set promptly and in good condition will be refunded his payment, and any non-bidder upon so returning such set will be refunded $15.00.

The City of Stamford, Conn., reserves the right to waive any informalities in, or to reject any, or all bids.

A certified treasurer's or cashier's check made payable to the order of the City of Stamford, Conn., in the amount of five per centum (5%) of the bid must be deposited by each bidder with his bid as a guarantee that in case the contract is awarded to him, that he will within five (5) days thereafter, execute such contract and furnish a satisfactory performance bond. On failure to do so, he shall forfeit the deposit as liquidated damages, and acceptance of the bid will be contingent upon the fulfillment of this requirement by the Bidder.

The successful bidder will be required to furnish a performance bond satisfactory to the City of Stamford, Conn., in the amount of the contract, and having as surety thereon such surety company or companies as are acceptabe to the City of Stamford, Conn.

The work will be let in seven separate contracts as follows:

Section I—Outfall Sewers.
Section II—
Subdivision No. 1—General Construction.
Subdivision No. 2—Garbage Incinerator.
Subdivision No. 3—Sludge Drying Equipment.
Subdivision No. 4—Electrical Work.
Subdivision No. 5—Plumbing.
Subdivision No. 6—Heating and Ventilating.

No Bidder may withdraw his bid within 45 days after the date set for the opening thereof. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof.

Date: October 10th, 1941.

JOHN F. CONNOLLY,
Commissioner of Finance.

Solomon & Keis,
Consulting Engineers,
Troy, N. Y.

Bids: November 3 (616)

Superstructures for Filtration Plant

GENERAL WORK
SUPERSTRUCTURES
SOUTH DISTRICT FILTRATION PLANT
DEPARTMENT OF PUBLIC WORKS
CITY OF CHICAGO
CHICAGO, October 10, 1941.

SEALED PROPOSALS will be received by the City of Chicago until 11 A. M., Monday, November 3, 1941, at Room 406 City Hall, for the construction of the Superstructures of the Low Lift Pumping Station, the Filter Building and the Administration Building of the South District Filtration Plant, located in the vicinity of East 79th Street and Lake Michigan, Chicago, Illinois, according to plans and specifications on file in the office of the Department of Public Works of said City, Room 406, City Hall.

The general scope of the work to be done includes all concrete and masonry, carpentry and millwork, lathing and plastering, roofing, architectural iron, certain mechanical equipment, plumbing, heating and electrical work. The major structural steel framework is being done by others.

Proposals must be made out upon blanks furnished at said office, and be addressed to said Department, indorsed "Proposal for General Work, Superstructures, South District Filtration Plant," and be accompanied with Fifty Thousand Dollars ($50,000.00) in money or a certified check for the same amount on some responsible bank located and doing business in the City of Chicago and made payable to the order of the Commissioner of Public Works.

Plans and specifications may be obtained upon payment of Twenty-five Dollars ($25.00) for each set, which will be refunded upon the return of said plans and specifications in good condition within thirty (30) days after the opening of bids. Deposits to be in the form of money or certified check.

In accordance with the provisions of the Act of the General Assembly of the State of Illinois, entitled "An Act regulating wages of laborers, mechanics and other workmen empoyed under contracts for public works," approved June 26, 1941, the general prevailing wage rates for work at the construction site are set forth in the specifications.

The Commissioner of Public Works reserves the right to reject any or all bids.

No proposal will be considered unless the party submitting the same shall furnish evidence satisfactory to the Commissioner of Public Works of ability, and the possession of the necessary facilities, together with sufficient pecuniary resources, to fulfill the conditions of the contract and specifications.

OSCAR E. HEWITT,
Commissioner of Public Works.

Bids: October 28 (619)

Additions to Sewage Treatment Plant

Sealed proposals will be received by the Mayor and Council of the Borough of Keansburg, New Jersey at the Municipal Hall, Keansburg, New Jersey, until 8.00 P. M. Eastern Standard Time, on Tuesday, October 28, 1941, for the construction of additions to the Sewage Treatment Plant and appurtenances, together with incidental work in connection therewith. Instructions to Bidders, Form of Proposal, Construction Regulations, Plans and Specifications and other contract documents may be examined at the office of Louis P. Booz, Consulting Engineer, 263 Madison Avenue, Perth Amboy, New Jersey, and one copy thereof may be obtained by each bidder upon deposit of the sum of $25.00 dollars. The deposit will be refunded to the bidder upon the return of the documents in good condition within 10 days after the opening of the bids, provided that a formal proposal has been submitted by the bidder.

Each bid must be accompanied by a certified check for *10* per centum of the amount of the bid, drawn upon an incorporated bank or trust company, payable to the Borough Treasurer, of Keansburg as a guarantee that in case the contract is awarded to the bidder, he will, within 10 days thereafter, execute such contract and furnish satisfactory performance bond. Upon failure so to do he shall forfeit the deposit as liquidated damages and the acceptance of the bid will be contingent upon the fulfillment of this requirement by the bidder. The checks of all excepting the three lowest bidders will be returned within 5 days after the opening of bids, and the remaining checks will be returned when the contract has been executed. No interest shall be allowed upon any such certified check.

No bidder may withdraw his bid for a period of 30 days after the date set for the opening thereof.

The successful bidder will be required to furnish a performance bond in approved form and with sureties satisfactory to the Mayor and Council which bond shall be in the amount of the contract.

The Mayor and Council reserves the right to waive any informalities in or to reject any or all bids, and/or to accept the bid that in its judgment will be for the best interests of the Borough of Keansburg.
By the order of the Mayor and Council,
Borough of Keansburg, N. J.

Richard A. Jessen
Borough Clerk

Bids: November 14 (622)

Sewers

Sealed bids will be received up to 8 P.M. (Eastern Standard Time) November 14, 1941 by the Borough Council of the Borough of Jenkintown, at the Borough office, Jenkintown, Pa. for the construction of approximately 3900 feet of 8" sanitary sewer and approximately 600 feet of 6" sanitary sewer (lateral connections) in the Noble Vista Section of the Borough of Jenkintown.

Plans and specifications may be obtained from Mr. A. C. J. Schabacker, Secretary, Borough Hall, Jenkintown, Pa., or from George B. Mebus, Borough Engineer, 112 South Easton Road, Glenside, Pa., upon deposit of $10.00 of which the sum of $5.00 will be refunded upon the return of said plans and specifications to the Engineer in good condition, on or before November 25, 1941.

The Borough Council reserves the right to reject any or all bids and award the contract as they may deem to the best interests of the Borough.

By order of the Borough Council.
A. C. J. Schabacker
Borough Secretary

CONSTRUCTION BY CONTRACT
"The Most for the Money"
HIGHWAYS — BUILDINGS — HEAVY & RAILROAD CONSTRUCTION
ASSOCIATED GENERAL CONTRACTORS OF AMERICA INC.
Munsey Bldg., Washington, D. C.

Bids: November 6 (617)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
ALBANY, N. Y.

Sealed proposals will be received by the undersigned at the State Office Building, 13th Floor, Albany, N. Y., until one o'clock p.m., on Thursday, November 6, 1941, for the following highways, bridges and railroad grade crossing elimination projects:

CONSTRUCTION

County	Deposit for plans	Bid deposit	Type	Miles	Pref. Rating
Rensselaer & Saratoga	$5	$10,000	200' Truss with two 100' & two 65' Girder Appr. Spans, Conc. Appr.	0.21	Unclassified Pref. Rating
Seneca	5	.....	Heating Office & Garage at Waterloo	....	.....
RECONSTRUCTION					
Albany	20	29,000	24' Concrete, Var. thick. 24' M.M.O. 51' I-Beam Br.	5.63	A-4 1076A Already Issued
Onondaga	10	23,000	Grading	6.26	A-4 1076A Already Issued
Steuben	5	4,000	30' I-Beam Br., 22' Conc. 8' 7" 8" & Misc. Work	0.18	A-3
Suffolk	5	2,600	30' I-Beam Br., Concrete & Misc. Work	0.104	A-2
RAILROAD CROSSING, ALSO RECONSTRUCTION					
Chemung & Steuben	5	13,500	22', 24' M.M.O. Elim. Struct. two 74' & one 104½' Girder 64' I-Beam Br.	0.54	A-4

Maps, plans, specifications, and estimates may be obtained at the office of the Division of Highways, Albany, N. Y., and at the office of the District Engineers in whose district the roads are to be improved. The names and addresses of the districts engineers and the counties in each district will be furnished upon request. Plans, etc. may be seen at the office of the State Department of Public Works, State Office Building, Worth and Center Streets, New York City.

The deposit for Plans and Proposal Forms for each contract containing 1 to 15 sheets is $5.00; 16 to 30 sheets, $10.00; over 30 sheets, $20.00. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement, and to the special provisions applying to projects financed with federal funds.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by cash, draft or certified check payable to the order of "State of New York, Division of the Treasury," for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

When optional types are permitted on contracts with federal funds, bidders must state in the space provided in the proposal the exact designation of the optional type upon which the proposal is predicated.

Minimum Wage Rate per hour for above work shall be as follows:

County	Skilled Labor	Intermediate Grade Labor	Unskilled Labor
Albany	.75	.55	.55
Chemung	.75	.60	.60
Onondaga	.75	.70	.70
Rensselaer	.75	.55	.50
Saratoga	.75	.55	.50
Steuben	.75	.60	.60
Suffolk	.75	.75	.75
Seneca	.75	.55	.50

UNLESS SHOWN OTHERWISE IN THE ITEMIZED PROPOSAL FOR EACH PROJECT.

The right is reserved to reject any or all bids.

A. W. BRANDT,
Supt. of Public Works.

Bids: November 5 (631)

Power Lines and Substation Installation

Notice is hereby given that The Central Nebraska Public Power and Irrigation District (hereinafter referred to as "Owner") will receive bids for the construction of the work hereinafter described. Said bids shall be prepared in writing on forms furnished by said Owner, and shall be filed in the office of the Secretary of said Owner at 1507-1509 West Second Street in Hastings, Nebraska on or before 11:00 o'clock A.M., C.S.T. November 5, 1941, at which time and place all bids will be publicly opened and read aloud in the presence of the bidders and their representatives. No bids will be received after said hour, and bids which are not prepared and filed strictly in accordance with the "Instructions to Bidders" may be rejected. Separate bids will be received for the construction, including the furnishing of all labor, materials, tools, equipment, transportation and services required for the following groups: 105A, 105B, 105C, 106A, 106B, 107A, 107B, 107C and 107D.

Group No. 105A. For the furnishing and erection of 4/0 Type V copperweld conductor for the 115 kv line from the Grand Island Substation to the Johnson Canyon No. 2 Power Plant. The estimated length of the conductor is 1,450 thousand feet.

Group No. 105B. For the furnishing and erection of the structures for the 115 kv line from the Grand Island Substation to the Johnson Canyon No. 2 Power Plant for which the following are the estimated quantities: 395 Type 301 Tangent Structures, 89 Type 301A Tangent Structures, 10 Type 301RR Tangent Railroad Structures, 7 Type 301B Tangent Structures, 1 Type 301AB Tangent Structure, 5 River Crossing Structures, 27 Type 302, 1°-4° Angle Structures, 10 Type 302A, 1°-4° Angle Structures, 9 Type 303, 4°-8° Angle Structures, 2 Type 303A, 4°-8° Angle Structures, 3 Type 304, 8°-20° Angle Structures, 1 Type 305, 20°-45° Angle Structures, 8 Type 307 Transposition Structures, 18 Type 308 Dead End Structures, 11 Type 309 Long Span Structures, 6 Type 309S Long Span Structures, 4 Type 311 Shield Wire Tangent Structures, 1 Type 312 Shield Wire Dead End Structure and 1 Type 600A Steel Tower Dead End Structure.

Group No. 105C. For the furnishing and erection of poles for the 115 kv line from the Grand Island Substation to the Johnson Canyon No. 2 Power Plant for which the following are the estimated quantities: Class 1 Poles; 12- 45 foot, 27-50 foot, 17-55 foot, 2-60 foot, 2-65 foot and 2-70 foot. Class 2 Poles; 12-45 foot, 21-50 foot, 96-55 foot, 158-60 foot and 63-65 foot. Class 3 Poles; 8-45 foot, 48-50 foot, 376-55 foot, 64-60 foot and 8-65 foot. Class 4 Poles; 88-45 foot, 138-50 foot, 92-55 foot, 16-60 foot and 6-65 foot.

Group No. 106A. Furnish and make complete installation of the addition to the substation of the Platte Valley Public Power and Irrigation District at Grand Island, Nebraska.

Group No. 106B. Furnish and make complete installation of the addition to the Johnson Canyon No. 2 Substation.

Group No. 107A. Furnish and deliver to Grand Island, Nebraska, 1-115 kv, 600 A., 500,000 kva interrupting capacity oil circuit breaker with solenoid operating mechanism.

Group No. 107B. Furnish and deliver to Lexington, Nebraska, 1-115 kv, 600 A., 500,000 kva interrupting capacity oil circuit breaker with solenoid operating mechanism.

Group No. 107C. Furnish and deliver to Grand Island, Nebraska, 2-three pole single throw 115 kv, 600 A., gang operated vertical break, rotating insulator, rotating blade for high pressure contact, air break switches and 1-three pole single throw 115 kv, 600 A., gang operated vertical break, rotating insulator, rotating blade for high pressure contact, air break switches with grounding blade.

Group No. 107D. Furnish and deliver to Lexington, Nebraska, 2-three pole single throw 115 kv, 600 A., 45° underhung mounted gang operated, rotating insulator, rotating blade for high pressure contact, air break switches and 1-three pole single throw 115 kv, 600 A., horizontal mounted, vertical break, rotating insulator, rotating blade for high pressure contact, air break switch with grounding blade.

The proposed construction contract, together with detailed Plans and Specifications for the construction of said work may be seen at the office of the Secretary of said Owner, and copies thereof obtained by depositing with the Secretary the sum of $25.00, which deposit will be returned upon the return of said Plans and Specifications within ten days after bids are received.

The schedule of minimum wage rates is set forth in Article Seventh of the Agreement.

The bid must be accompanied by a certified check drawn on a bank which is a member of the Federal Reserve System, or which is a member of the Federal Deposit Insurance Corporation, in the sum of not less than 5 per cent of the amount bid. Said check shall be made payable to Claude B. Miller, Treasurer of said Owner. In the event a bidder, who is awarded the contract, refuses or fails to enter into such contract, the amount of his check will be retained by said Owner as liquidated damages and not as a penalty for such failure or refusal. Bidder's Bond upon forms furnished by the Owner, for payment of said liquidated damages, written by an approved surety company and made payable to said Owner, may be deposited in lieu of said certified check.

The Contractor will be required, at the time the contract is executed, to furnish a performance bond in an amount equal to 100 per cent of the contract price. A copy of the required bond is attached to the Contract Documents.

Unless otherwise required by law, no bidder may withdraw his bid for a period of sixty (60) days after the date of opening thereof. The Owner reserves the right to reject any and all bids and to waive any informalities therein.

Dated this 15th day of October, 1941.

THE CENTRAL NEBRASKA PUBLIC POWER AND IRRIGATION DISTRICT
Glen Wallace,
President.

ATTEST:
R. O. Canaday,
Secretary

Bids: October 29 (630)

VILLAGE OF BALLSTON SPA, N. Y.

Sealed bids for the construction of a 30 inch outfall sewer, a 16 inch cast iron force main, sewage pump, sewage disintegrator, and improvements to the sewage pumping station will be received by the Board of Trustees, at the Village Office until seven-thirty P. M. Eastern Standard Time, on the 29th day of October, 1941, and then publicly opened and read aloud.

The work will be divided into two sections as follows: Section 1—Outfall Sewer and Force Main; Section 2—Sewage Pump, Sewage Disintegrator and Improvements to the Sewage Pumping Station. Contractors may bid on either or both Sections.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications and Performance Bond may be examined at the Office of the Village Clerk, Village of Ballston Spa and at the office of Solomon & Keis, Consulting Engineers, 257 Broadway, Troy, N. Y., copies therefor may be obtained at the said office of Solomon & Keis upon payment of $25.00 for each set. Any bidder upon returning such set promptly and in good condition, will be refunded his payment, and any non-bidder upon so returning such set will be refunded $20.00.

The Board of Trustees of the Village of Ballston Spa, reserves the right to waive any informalities in or to reject any or all bids.

Each bidder must deposit with his bid security in an amount of not less than five percentum (5%) of the base bid in the form and subject to the conditions provided in the Information for Bidders.

No bidder may withdraw his bid within 45 days after the actual date of the opening thereof.

October 17, 1941

Donald D. Hall,
Village Clerk.

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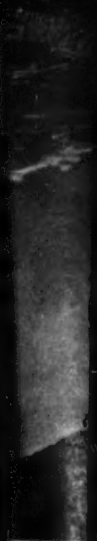
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